

**Circuit notes****COMPONENT VALUES**

Resistors : no suffix =ohms, k =kilohms, M =megohms.

Capacitors : no suffix =microfarads, p =picofarads, n =nanofarads.

† value selected during test, nominal value shown.

**VOLTAGES**

Voltage measurements were made using a 20 k $\Omega$ /V meter, and are shown adjacent to the point to which the measurement refers.


**WAVEFORMS**


Oscillograms were taken using a dual trace, 100 MHz bandwidth, oscilloscope, and a x10 probe. Control settings of the TF 2370 together with oscilloscope triggering information, and horizontal and vertical sensitivities at the probe tip, are shown.

**SYMBOLS**

Symbols are in accordance with BS 3939 with the following additions :

 test point

 waveform reference number

 sub-assembly designation



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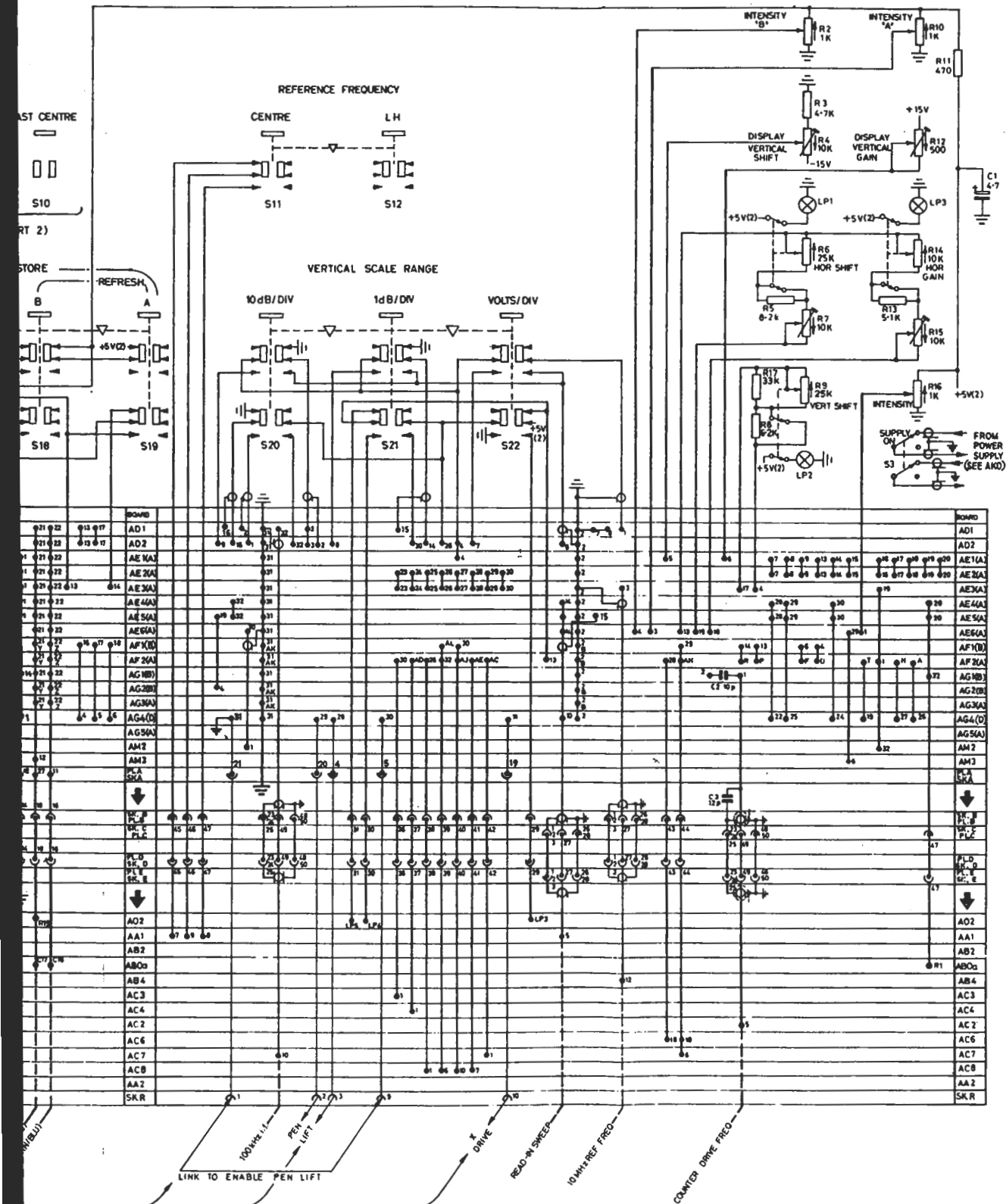
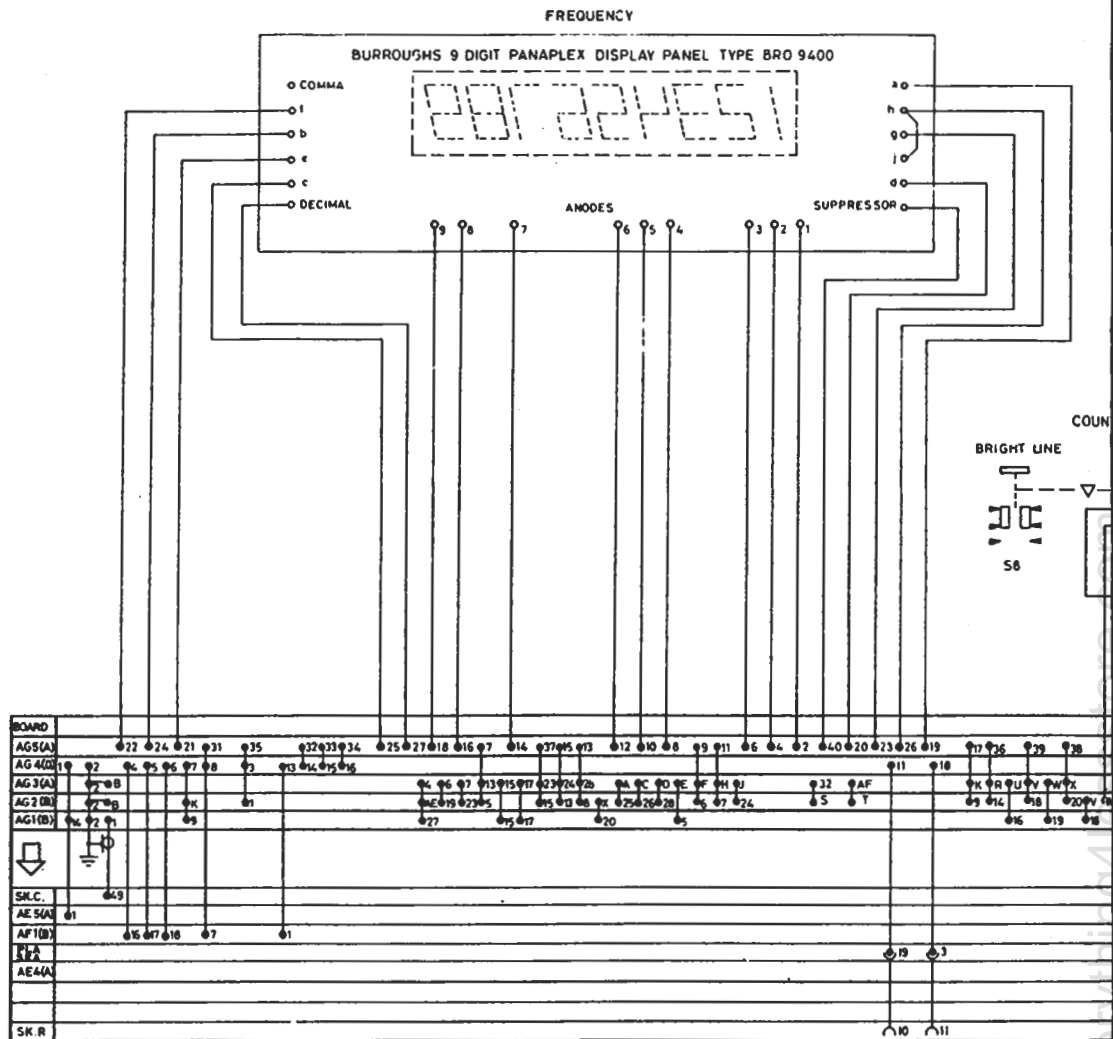


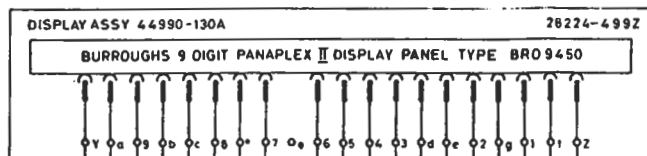
Fig. 7.1 Front panel wiring A01 (part 1)



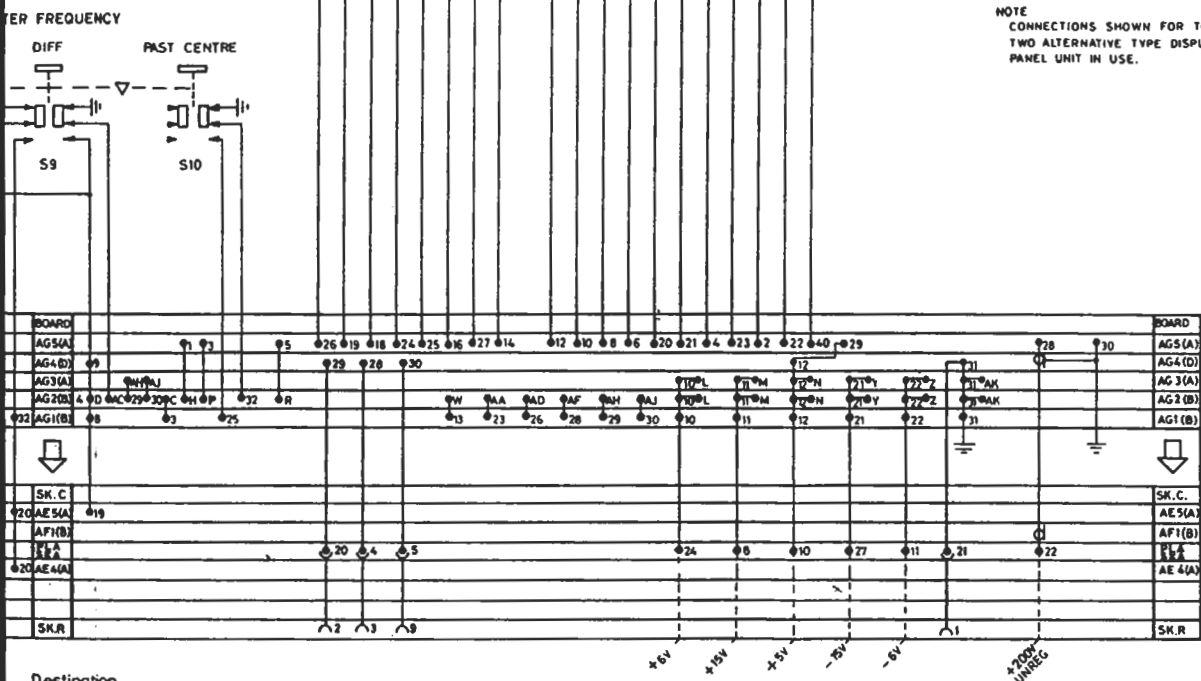
#### PLA WIRING CONNECTIONS

Pin no.	Destination.	Pin no.	Destination.	Pin no.
1.	— Braid of co-ax from pin 25 on AM2.	11.	— 6V (Blue/Brown) to:-	25.
2.		(a) Pin 22 on AD1, AD2, AE1(A), AE2(A), AE3(A), AE4(A), AE5(A), AE6(A), AG1(B) & pin 22 & Z on AF1(B), AF2(A)	26.	
3.	— Lead to pin 18 on AG4(D)	(b) Pin 16 on SK. B.	27.	
4.	— Lead to pin 28 on AG4(D)	12.	— Earth.	
5.	— Lead to pin 30 on AG4(D)	13.	— Lead to c.r.t. heater.	
6.		14.		
7.	— +80V (Red/Green) to:- Pin 8 of AM2 and pin 8 of AM3.	15.	— Mains supply lead (see details on AKO)	28.
8.	— +15V (Red/Orange) to:-	16.	— Mains supply lead (see details on AKO)	29.
(a)	Pin 11 on AD1, AD2, AE1(A), AE2(A), AE3(A), AE4(A), AE5(A), AE6(A), AG1(B) & pins 11 & M on AF1(B), AF2(A), AG2(B) & AG3(A).	17.	— Inner of co-ax from pin 26 of AM2	30.
(b)	Pin 6 on AM2 and pin 22 on AM3.	18.		31.
(c)	Pin 6 on SK. B.	19.	— Lead to pin 11 on AG4(D)	32.
9.	— +5V(2) (Red/Black with red sleeve) to:-	20.	— Lead to pin 29 on AG4(D)	
(a)	Pin 12 on AD1, AD2, AE1(A), AE2(A), AE3(A), AE4(A), AE5(A), AE6(A).	21.	— Lead to pin 31 on AG4(D)	
(b)	All upper front panel connections (see AO1 Part 1.)	22.	— +200V to pin 28 of AG5(A) [RED]	
(c)	Pin 12 on SK. B.	23.	— +30V (Red/White) to:-	
10.	— +5V(1) (Red/Black with brown sleeve) to:-	(a)	Pin 20 of AM2 and pin 20 of AM3	
(a)	Pin 12 & N on AF1(B), AF2(A), AG2(B) & AG3(A) and Pin 12 on AG1(B) & AG4(D).	(b)	Pin 4 on SK. B.	
(b)	Pin 16 on SK. B.	24.	— 6V (Red/Brown) to:-	
		(a)	Pin 10 on AD1, AD2, AE1(A), AE2(A), AE3(A), AE4(A), AE5(A), AE6(A), AG1(B) & pin 10 & L on AF1(B), AF2(A), AG2(B) & AG3(A).	
		(b)	Pin 8 on SK. B.	
		(c)	R1 on AO1 (Part 1)	

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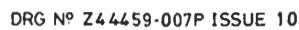
NOTE  
CONNECTIONS SHOWN FOR THE  
TWO ALTERNATIVE TYPE DISPLAY  
PANEL UNIT IN USE.



#### Destination.

- +5V(2) connected to pin 9.
- +5V(1) connected to pin 10.
- 15V (Blue/Orange) to:-
  - (a) Pin 21 on AD1, AD2, AE1(A), AE2(A), AE3(A), AE4(A), AE5(A), AE6(A), AG1(B) & pin 21 & Y on AF1(B), AF2(A), AG2(B) & AG3(A).
  - (b) Pin 12 on AM3.
  - (c) R 4 on AD1 (Part 1)
  - (d) Pin 18 on SK B.
- Earth, connected to pin 12.
- Lead to c.r.t. heater
- Mains supply lead (see details on AKO)
- Mains supply lead (see details on AKO)

Fig. 7.2 Upper front panel wiring A01 (part 2)



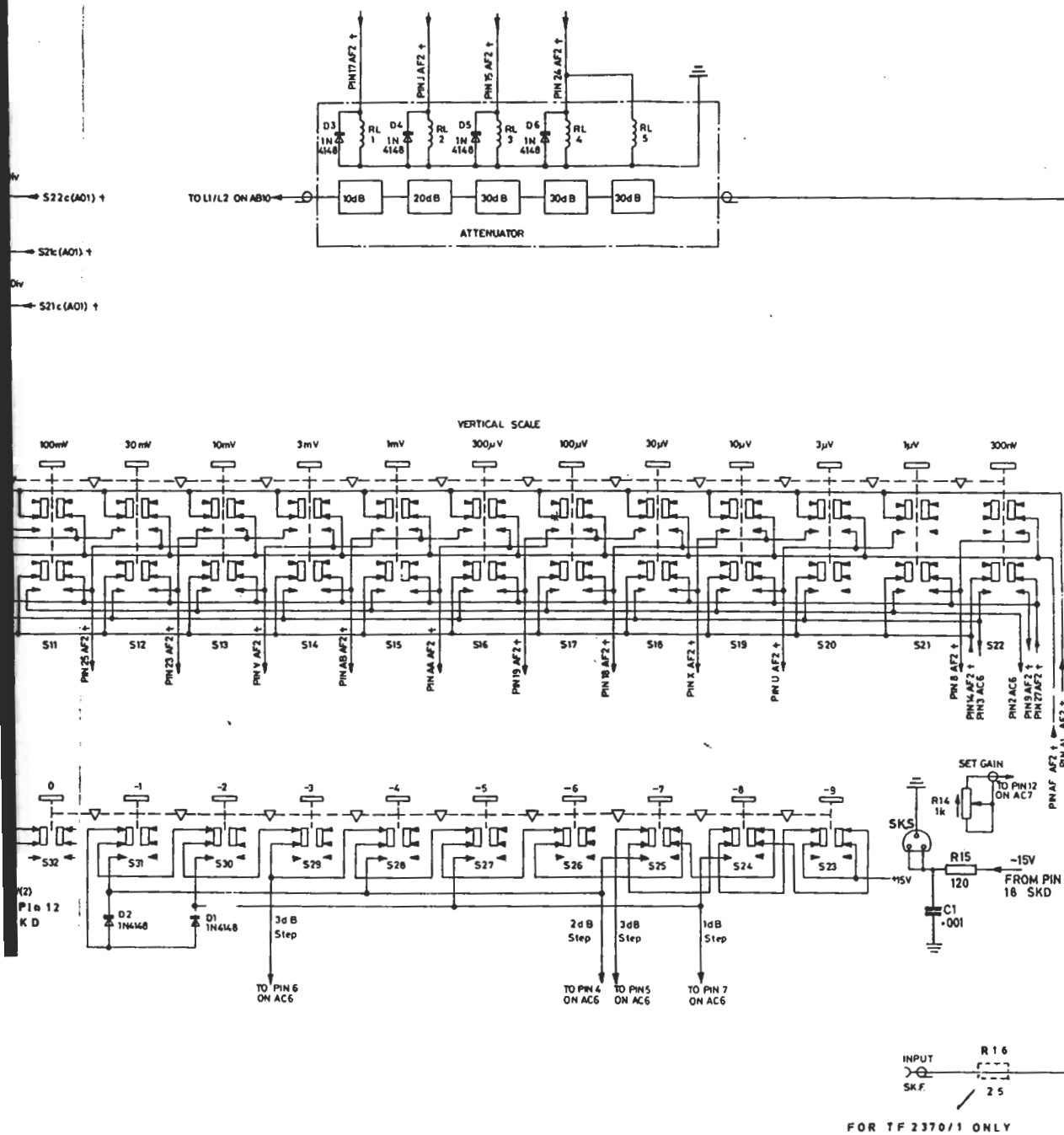
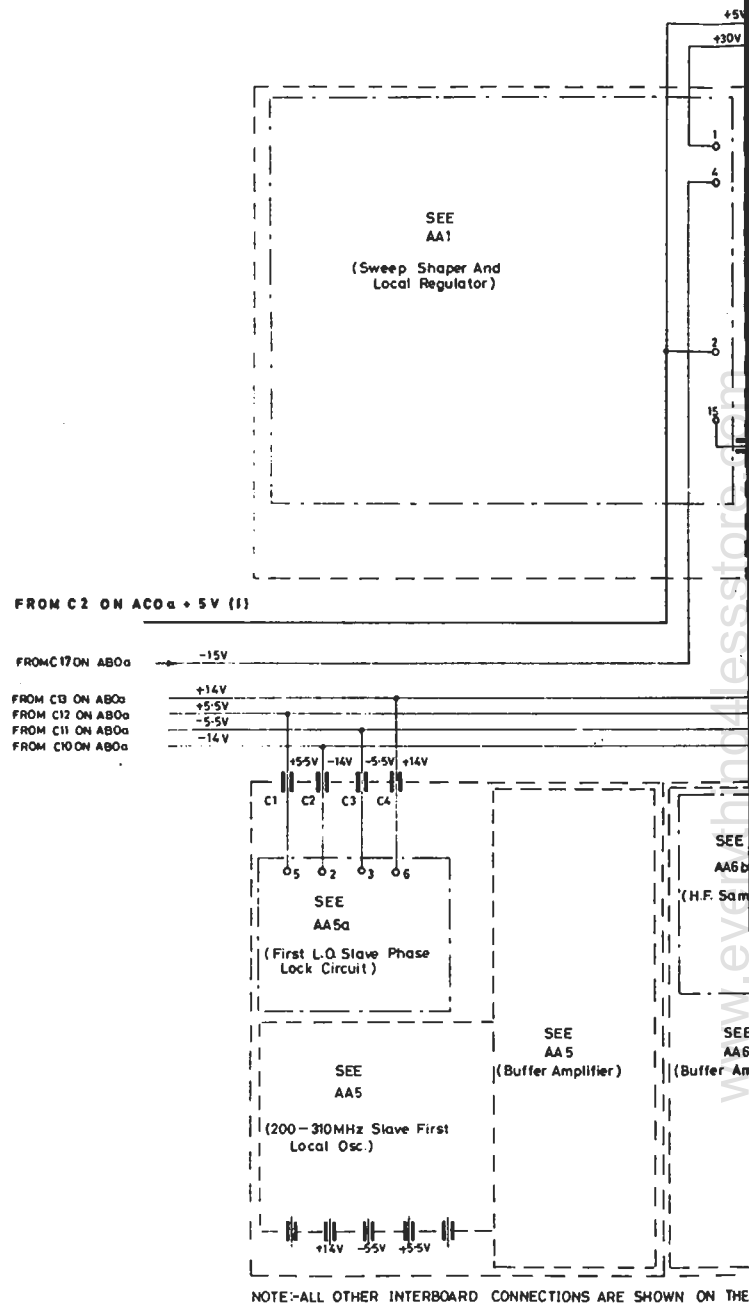


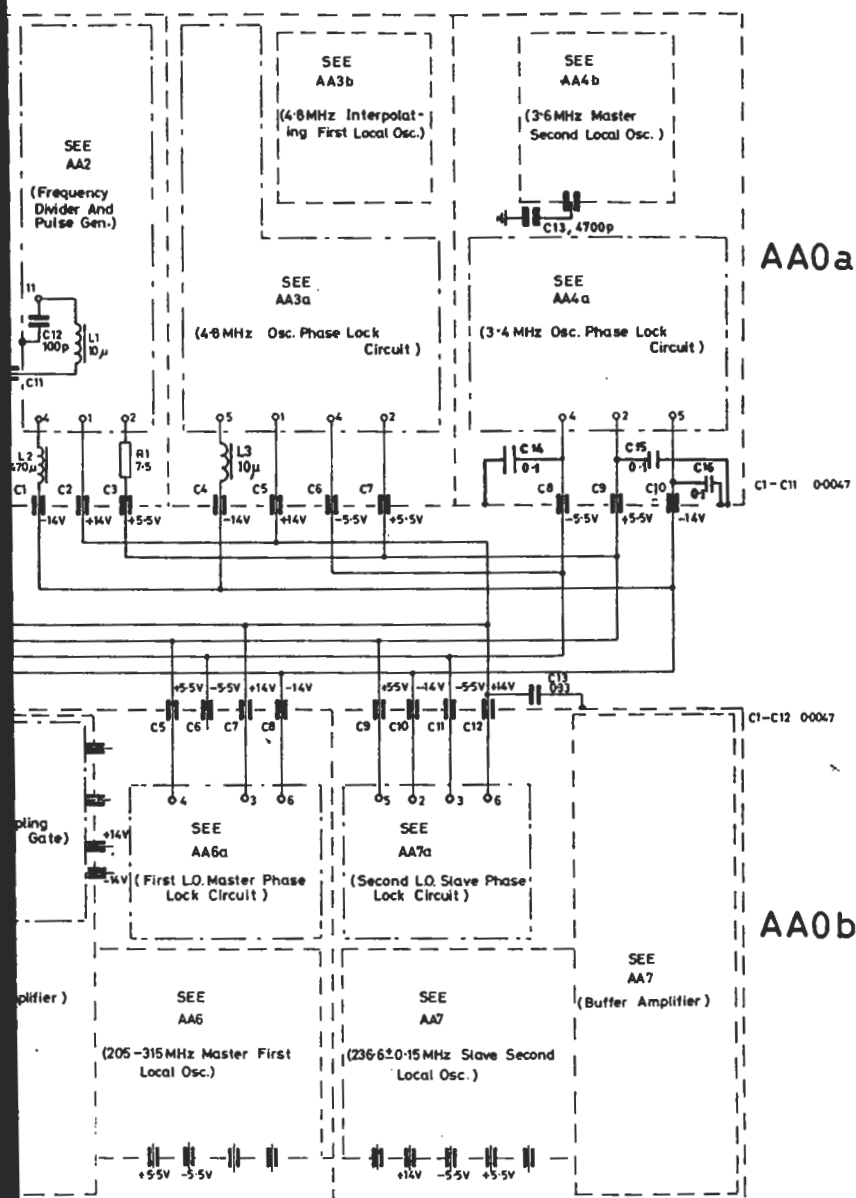
Fig. 7.3 Lower control panel A02



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(1) FROM PIN 10 OF SK D ON A01  
 FROM PIN 4 OF SK D ON A01

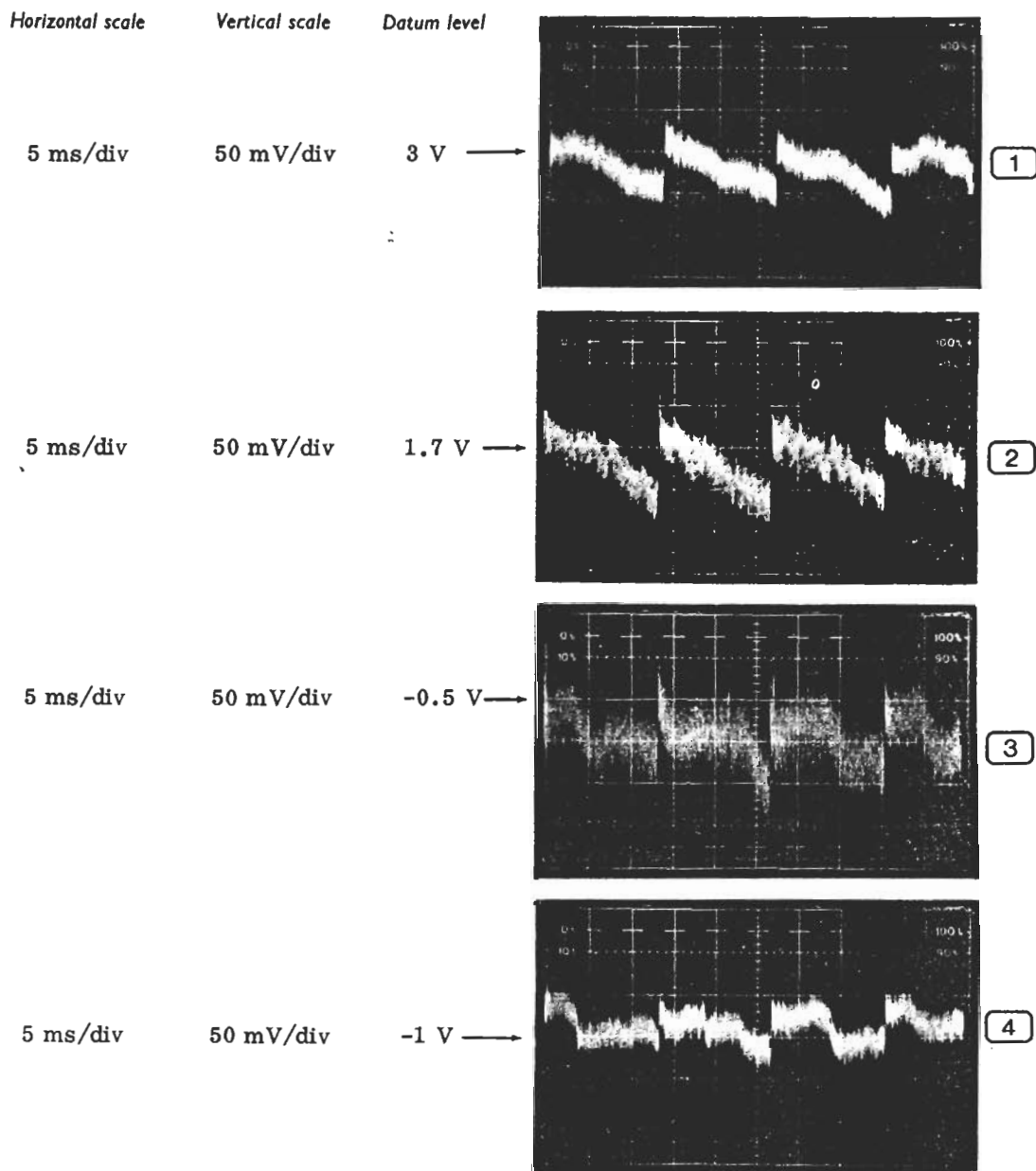


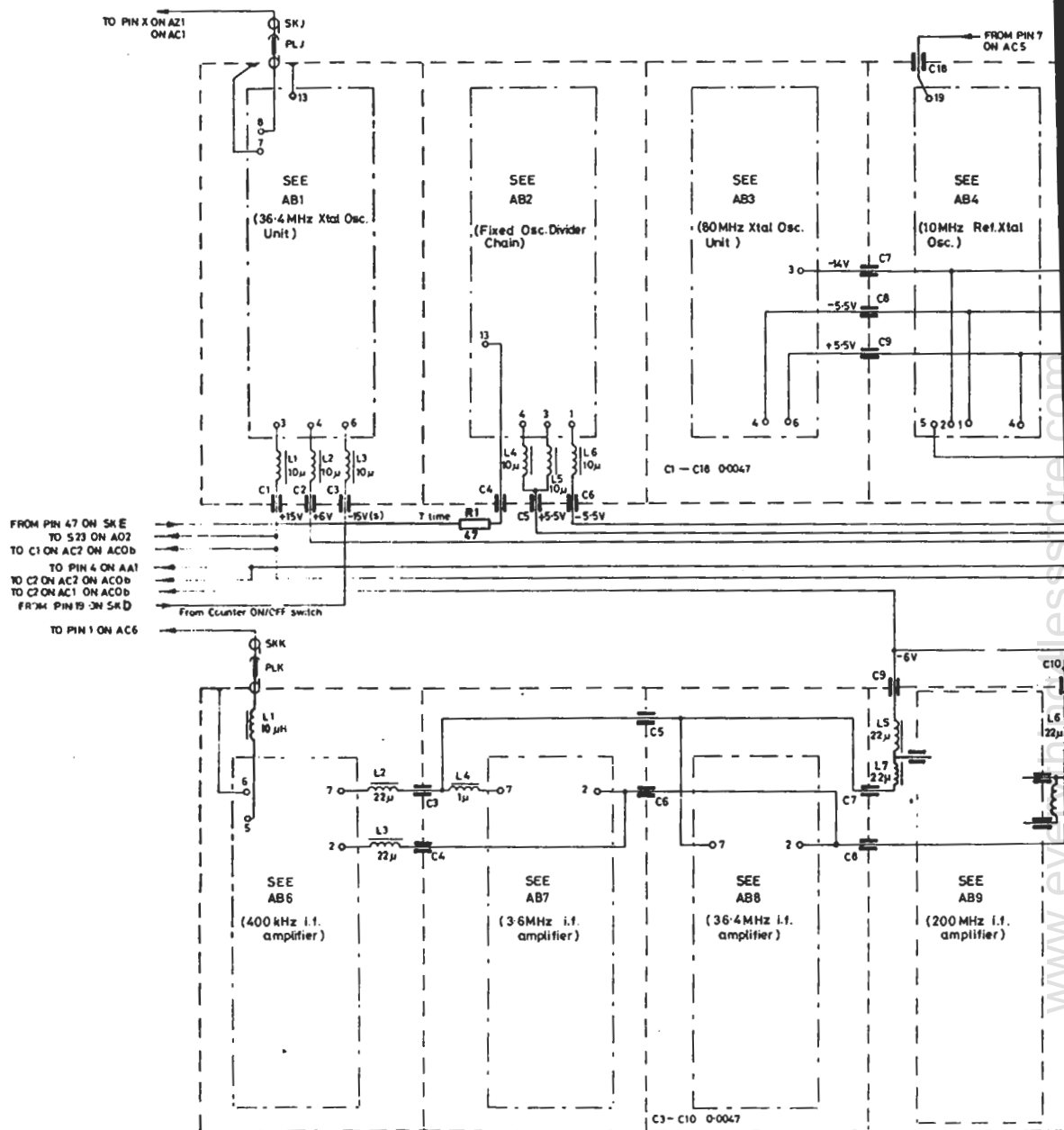
OR RESPECTIVE CIRCUIT DIAGRAMS.

Fig. 7.4 AA tray interconnections

## Waveforms for AB5

TF 2370 controls - HORIZONTAL SCALE and RANGE : 10 MHz/DIV  
FILTER BANDWIDTH : WIDE  
COUNTER ON/OFF : ON





NOTE:-ALL OTHER INTERBOARD CONNECTIONS ARE SHOWN ON THEIR RESPECTIVE CIRCUIT DIAGRAMS.

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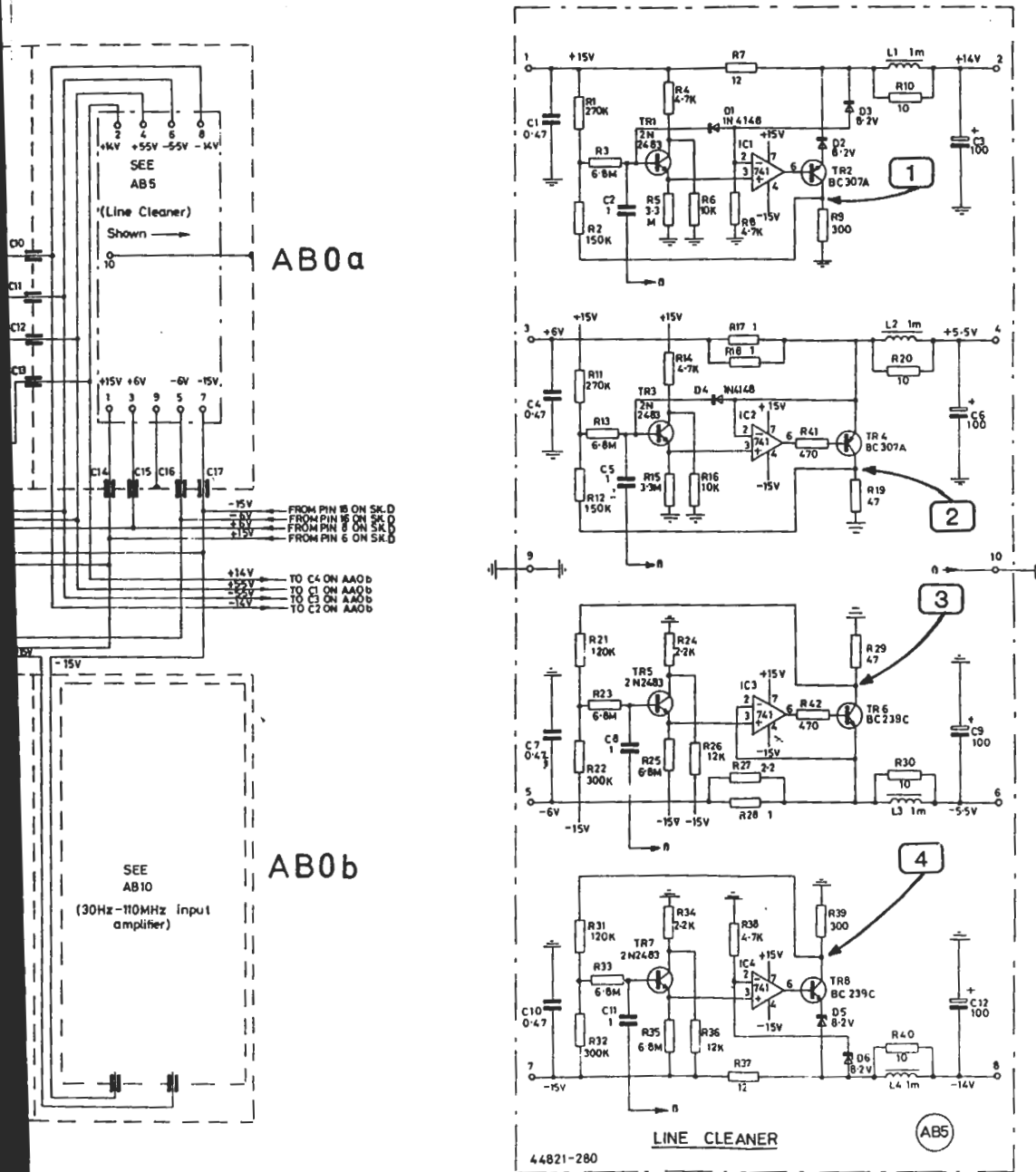
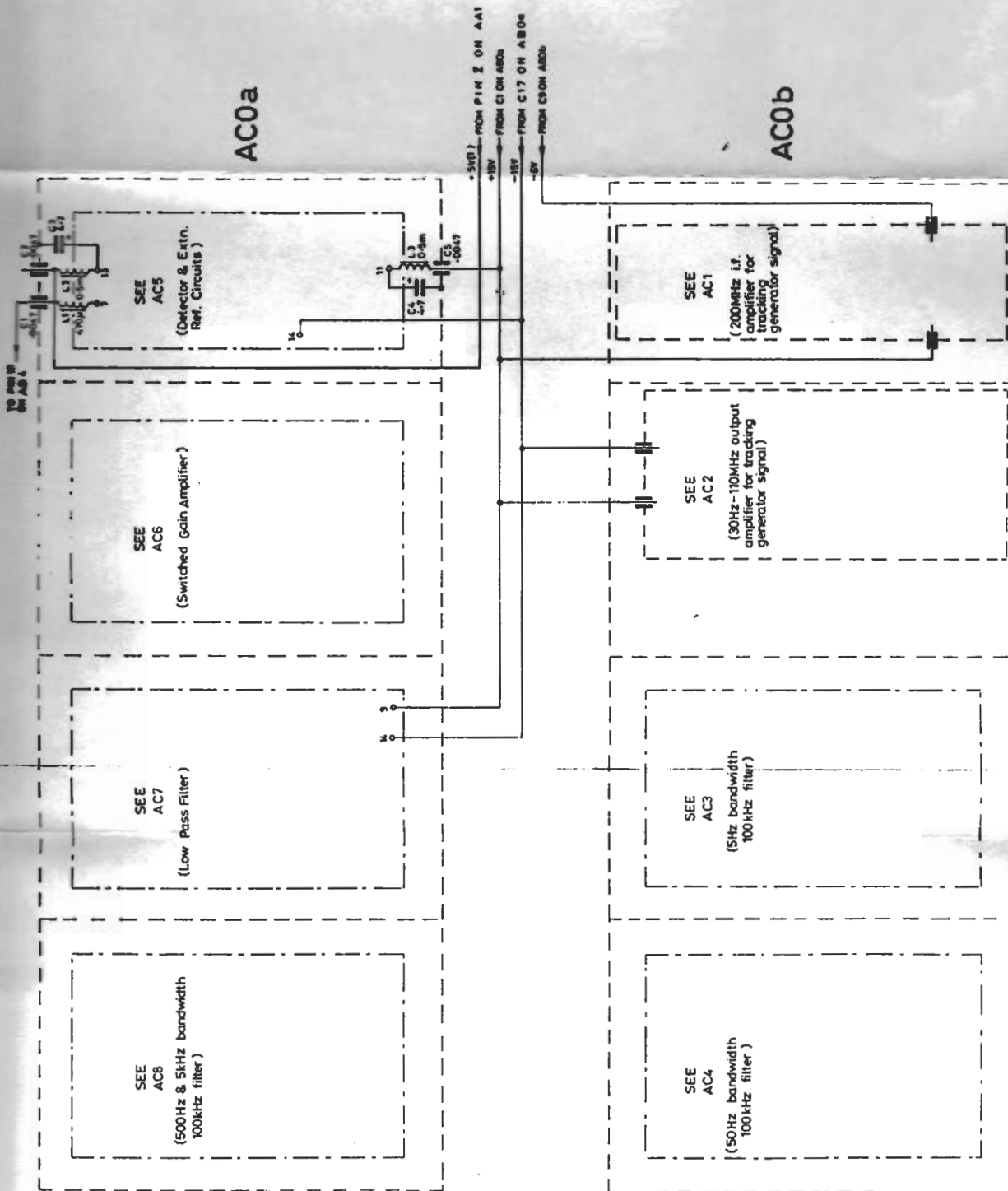
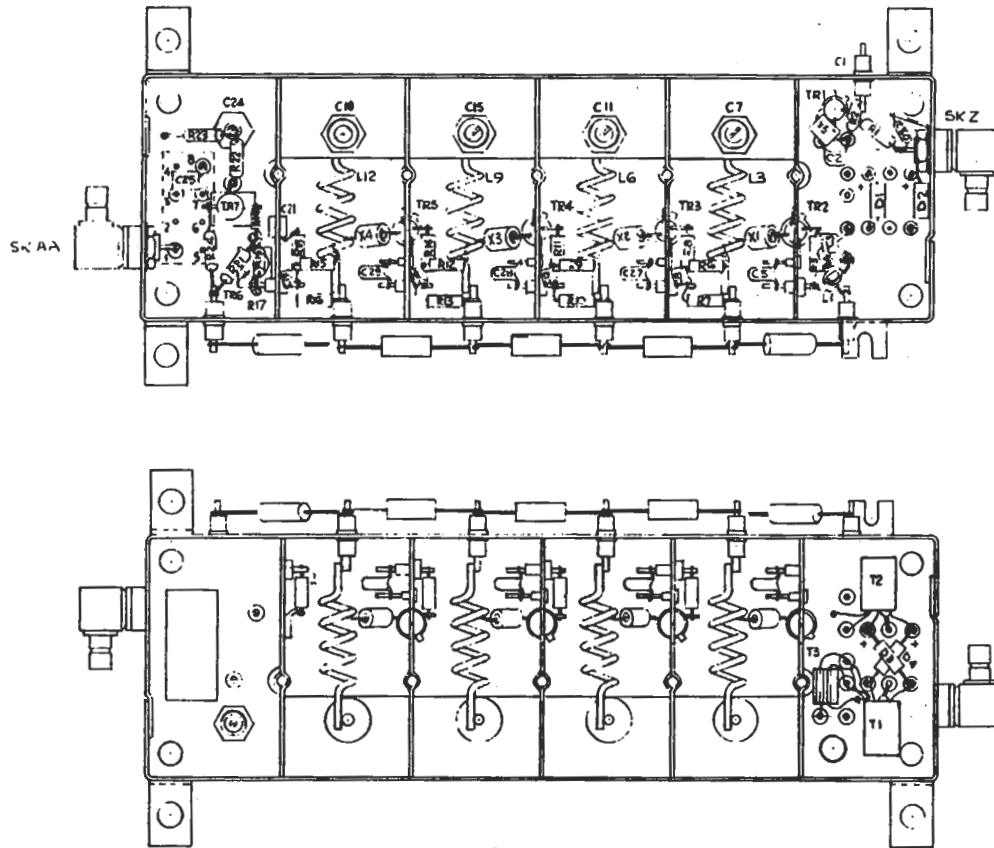


Fig. 7.5 AB tray interconnections and line cleaners AB5

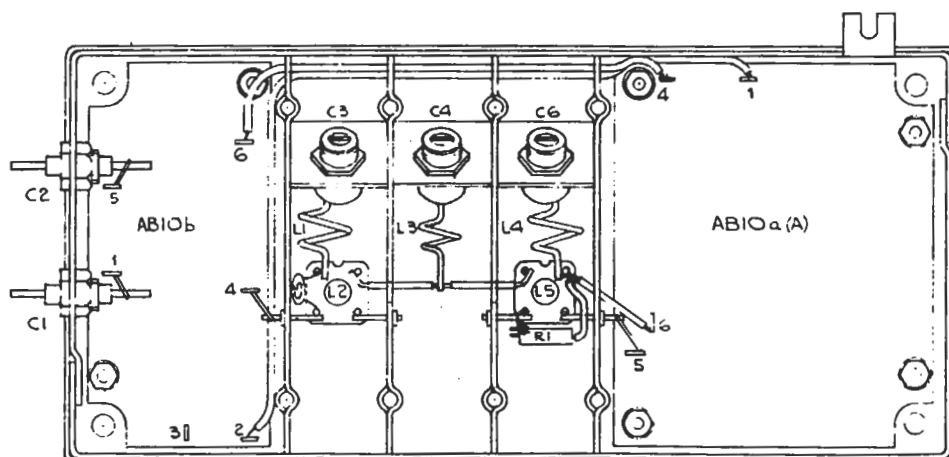


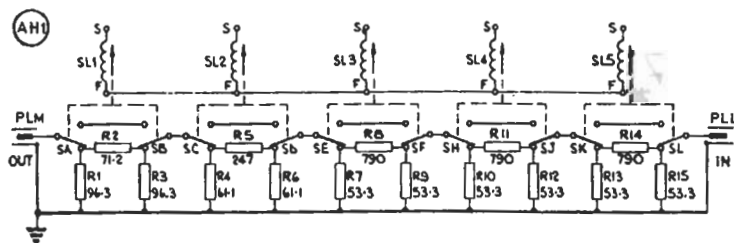
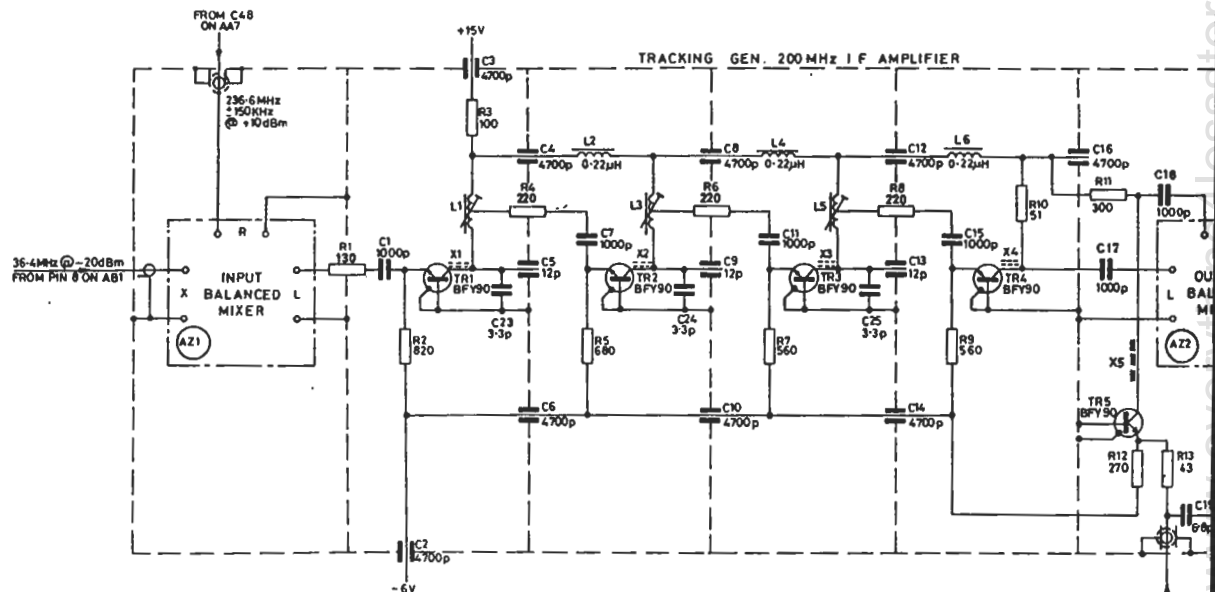
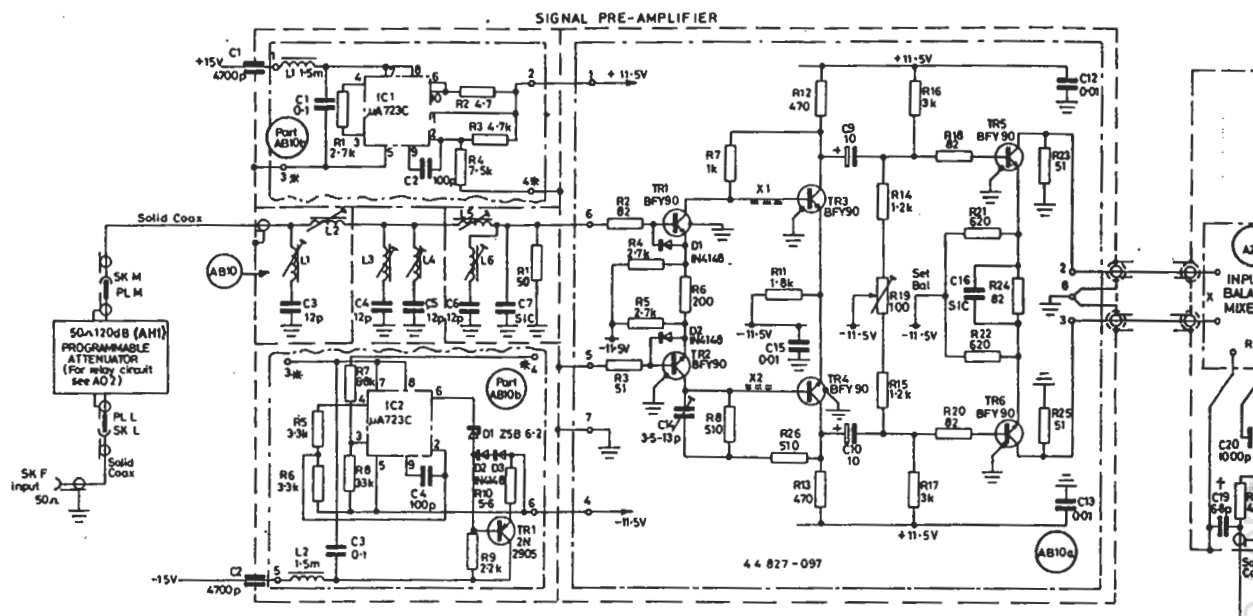
NOTE:-ALL OTHER INTERBOARD CONNECTIONS ARE SHOWN ON THEIR RESPECTIVE CIRCUIT DIAGRAMS

Layout of AB9



Layout of AB10 a





NOTE: SOME SCREW CORES ARE SEALED WITH WAX AND IF ADJUSTMENT IS NEEDED, TO AVOID DAMAGE TO THE CORE, IT IS NECESSARY TO REMOVE THE WAX.

\* INDICATES LEAD ROUTED VIA REAR PANEL PL & SK SEE AO1 PL 1

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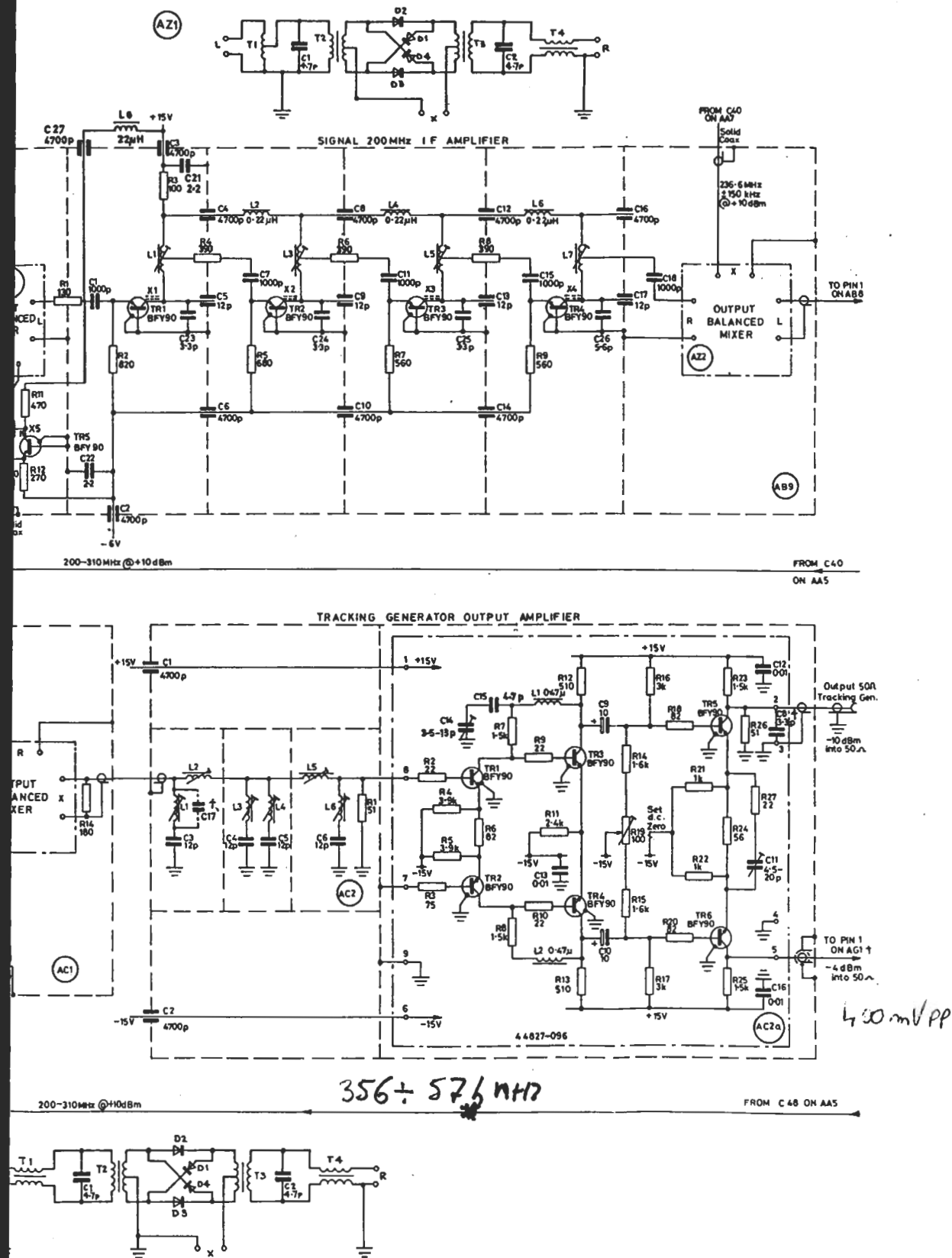
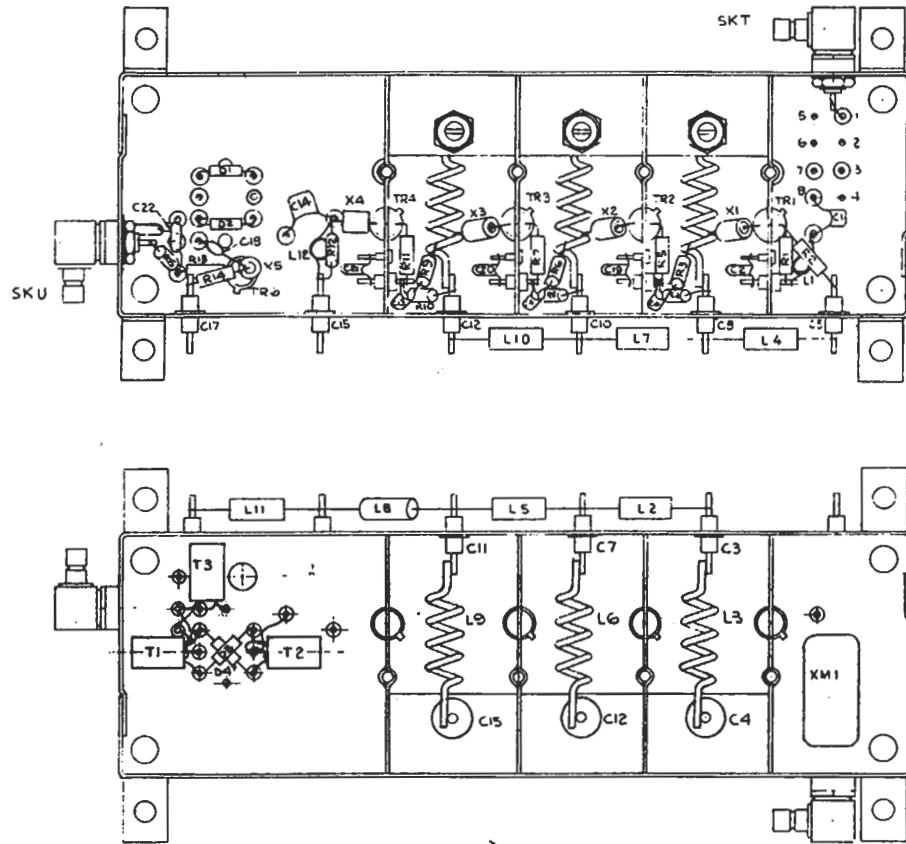


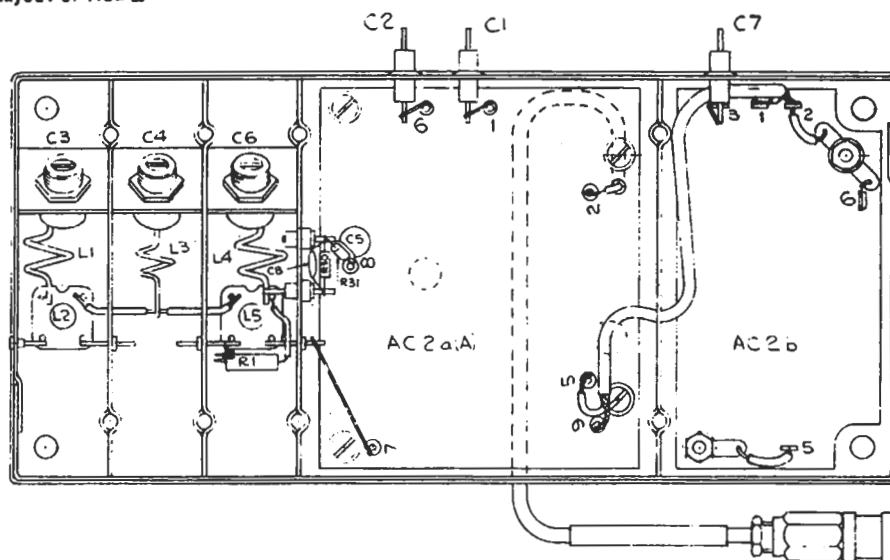
Fig. 7.7 Circuits: AB9, AB10, AC1, AC2 and AH1



Layout of AC1



Layout of AC2 a.

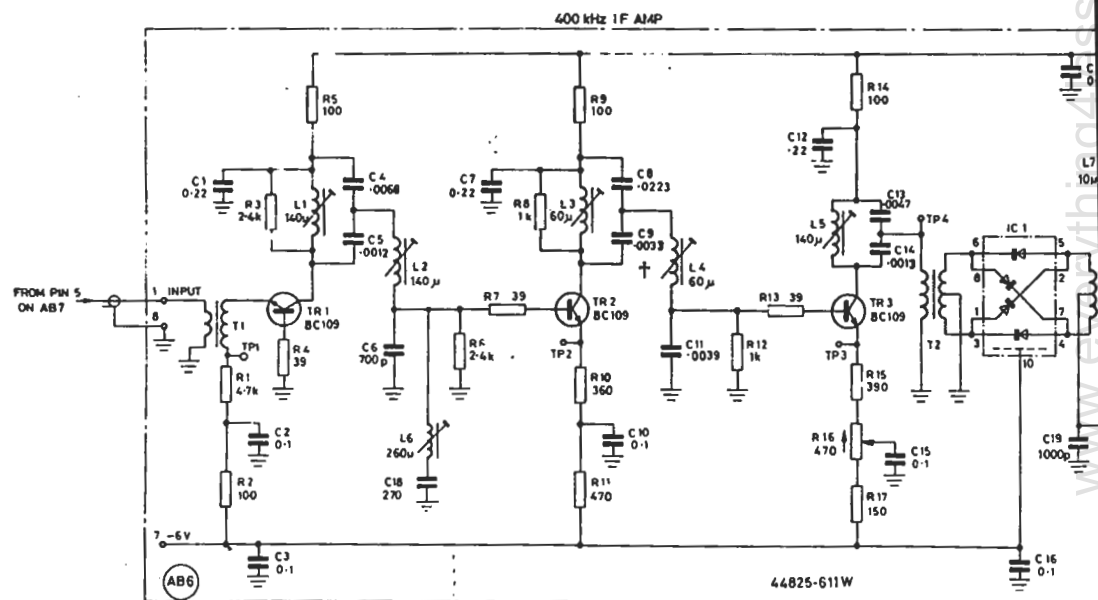
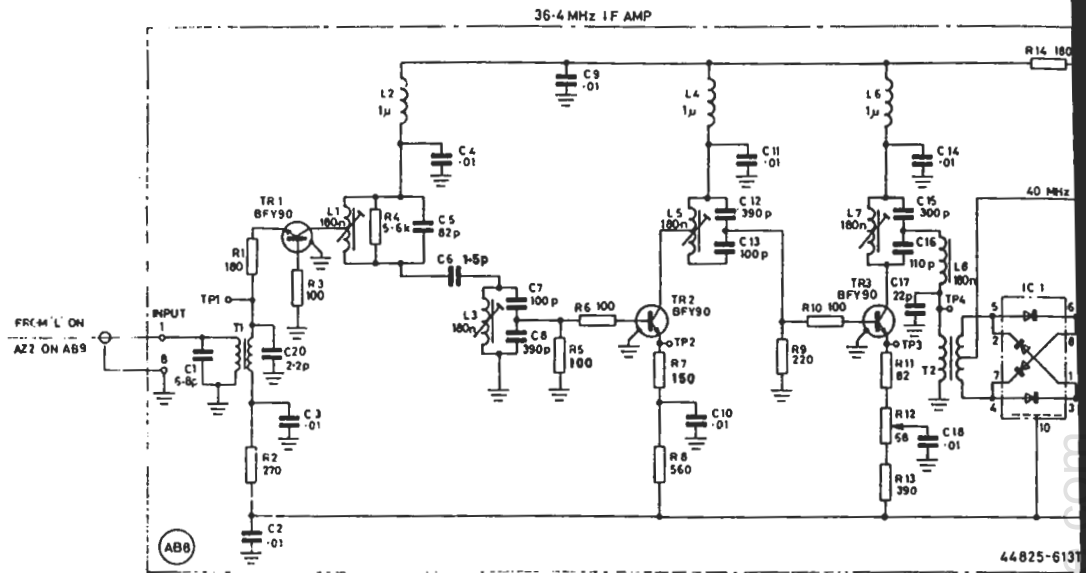


# CALIBRATION TABLE

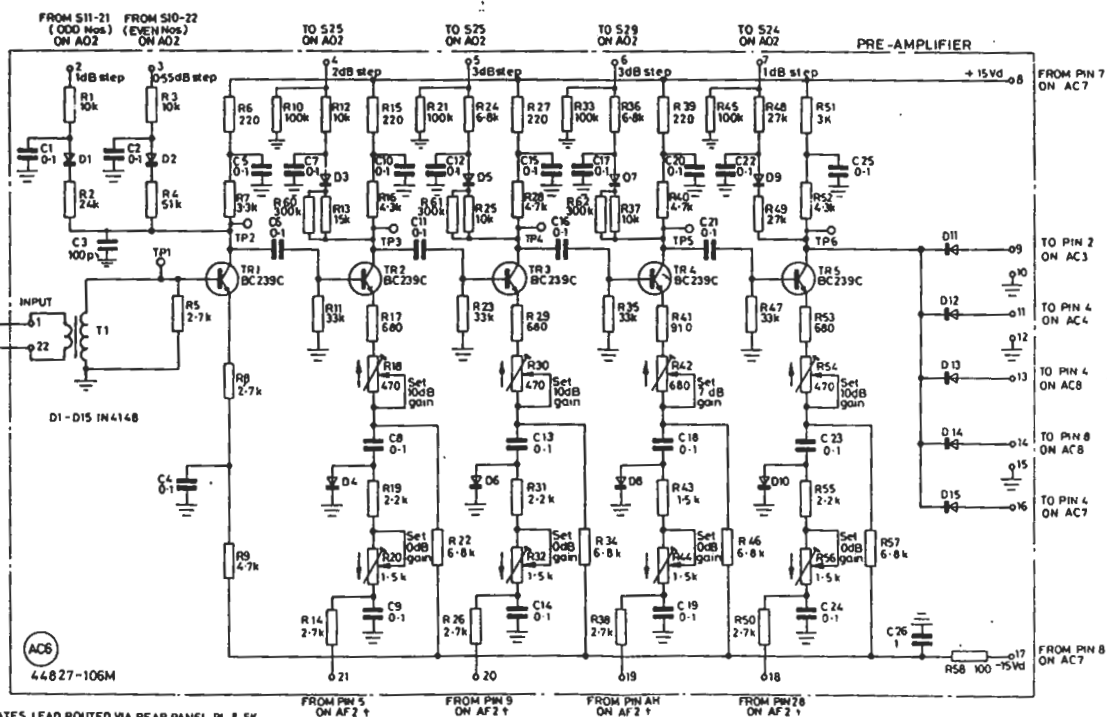
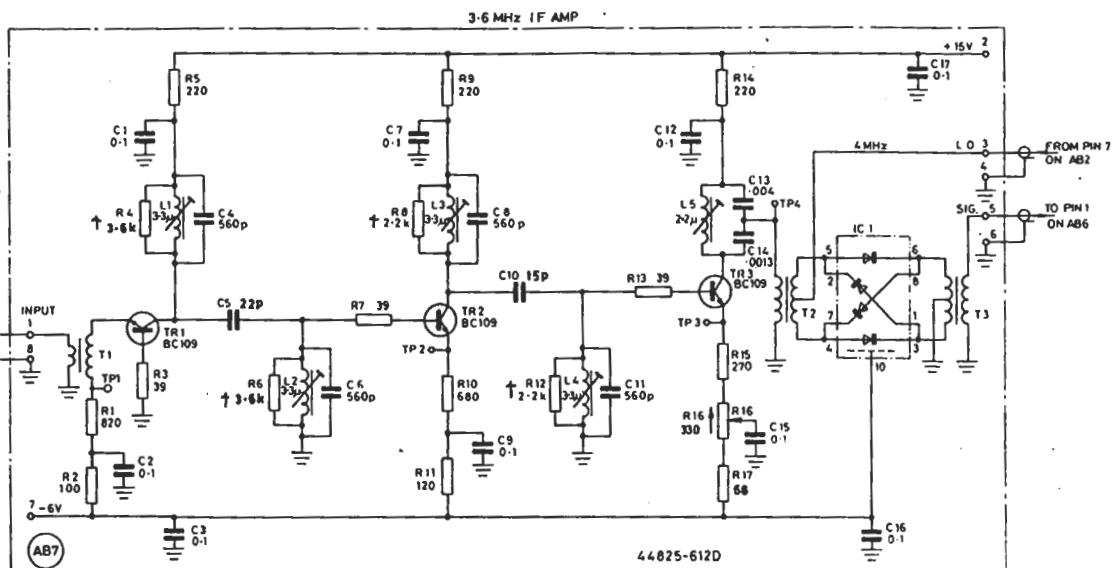
Valid for top of screen signal levels displayed on the  
10 dB/DIV position using MANUAL mode.

Input sen- sitivity for top of screen	Input attenuator setting	Signal level from attenuator	Input amp & 360 MHz i.f. amp gain	Signal level at pin 1 of AB8, AB7, AB6 & AC6*	Gain from pin 1 to TP2 on AC6	Signal level at TP 2 on AC6*	Gain from TP2 to TP6 on AC6	Gain from TP6 on AC6 to pin 10 of AC7	Signal level at pin 32 on AD1*	DC level at pin 4 of AB2	Filter bandwidth selected
+30 dBm	80dB 70dB 60dB 60dB 60dB	-50dBm -40dBm -30dBm -30dBm -30dBm	+13dB	-37dBm(9mV) -27dBm(28.5mV) -17dBm(90mV) -17dBm(90mV) -17dBm(90mV)	x7.1 (+17dB)	64mV 200mV 640mV 640mV 640mV	0dB 0dB 0dB 10dB 17dB	40dB 30dB 20dB 10dB 3dB	6.4V	+2V d.c.	5Hz 50Hz 500Hz 5kHz 50kHz
+20 dBm	70dB 60dB 50dB 50dB 50dB	-50dBm -40dBm -30dBm -30dBm -30dBm	+13dB	-37dBm(9mV) -27dBm(28.5mV) -17dBm(90mV) -17dBm(90mV) -17dBm(90mV)	x7.1 (+17dB)	64mV 200mV 640mV 640mV 640mV	0dB 0dB 0dB 10dB 17dB	40dB 30dB 20dB 10dB 3dB	6.4V	+2V d.c.	5Hz 50Hz 500Hz 5kHz 50kHz
+10 dBm	60dB 50dB 40dB 40dB 40dB	-50dBm -40dBm -30dBm -30dBm -30dBm	+13dB	-37dBm(9mV) -27dBm(28.5mV) -17dBm(90mV) -17dBm(90mV) -17dBm(90mV)	x7.1 (+17dB)	64mV 200mV 640mV 640mV 640mV	0dB 0dB 0dB 10dB 17dB	40dB 30dB 20dB 10dB 3dB	6.4V	+2V d.c.	5Hz 50Hz 500Hz 5kHz 50kHz
0 dBm	50dB 40dB 30dB 30dB 30dB	-50dBm -40dBm -30dBm -30dBm -30dBm	+13dB	-37dBm(9mV) -27dBm(28.5mV) -17dBm(90mV) -17dBm(90mV) -17dBm(90mV)	x7.1 (+17dB)	64mV 200mV 640mV 640mV 640mV	0dB 0dB 0dB 10dB 17dB	40dB 30dB 20dB 10dB 3dB	6.4V	+2V d.c.	5Hz 50Hz 500Hz 5kHz 50kHz
-10 dBm	40dB 30dB 20dB 20dB 20dB	-50dBm -40dBm -30dBm -30dBm -30dBm	+13dB	-37dBm(9mV) -27dBm(28.5mV) -17dBm(90mV) -17dBm(90mV) -17dBm(90mV)	x7.1 (+17dB)	64mV 200mV 640mV 640mV 640mV	0dB 0dB 0dB 10dB 17dB	40dB 30dB 20dB 10dB 3dB	6.4V	+2V d.c.	5Hz 50Hz 500Hz 5kHz 50kHz
-20 dBm	30dB 20dB 10dB 10dB 10dB	-50dBm -40dBm -30dBm -30dBm -30dBm	+13dB	-37dBm(9mV) -27dBm(28.5mV) -17dBm(90mV) -17dBm(90mV) -17dBm(90mV)	x7.1 (+17dB)	64mV 200mV 640mV 640mV 640mV	0dB 0dB 0dB 10dB 17dB	40dB 30dB 20dB 10dB 3dB	6.4V	+2V d.c.	5Hz 50Hz 500Hz 5kHz 50kHz
-30 dBm	20dB 10dB 0dB 0dB 0dB	-50dBm -40dBm -30dBm -30dBm -30dBm	+13dB	-37dBm(9mV) -27dBm(28.5mV) -17dBm(90mV) -17dBm(90mV) -17dBm(90mV)	x7.1 (+17dB)	64mV 200mV 640mV 640mV 640mV	0dB 0dB 0dB 10dB 17dB	40dB 30dB 20dB 10dB 3dB	6.4V	+2V d.c.	5Hz 50Hz 500Hz 5kHz 50kHz
-40 dBm	10dB 0dB 0dB 0dB 0dB	-50dBm -40dBm -40dBm -40dBm -40dBm	+13dB	-37dBm(9mV) -27dBm(28.5mV) -27dBm(28.5mV) -27dBm(28.5mV) -27dBm(28.5mV)	x7.1 (+17dB)	64mV 200mV 200mV 200mV 200mV	0dB 0dB 10dB 20dB 27dB	40dB 30dB 20dB 10dB 3dB	6.4V	+2V d.c.	5Hz 50Hz 500Hz 5kHz 50kHz
-50 dBm	0dB 0dB 0dB 0dB 0dB	-50dBm -50dBm -50dBm -50dBm -50dBm	+13dB	-37dBm(9mV) -37dBm(9mV) -37dBm(9mV) -37dBm(9mV) -37dBm(9mV)	x7.1 (+17dB)	64mV 64mV 64mV 64mV 64mV	0dB 10dB 20dB 30dB 37dB	40dB 30dB 20dB 10dB 3dB	6.4V	+2V d.c.	5Hz 50Hz 500Hz 5kHz 50kHz

\* Voltages are peak to peak values



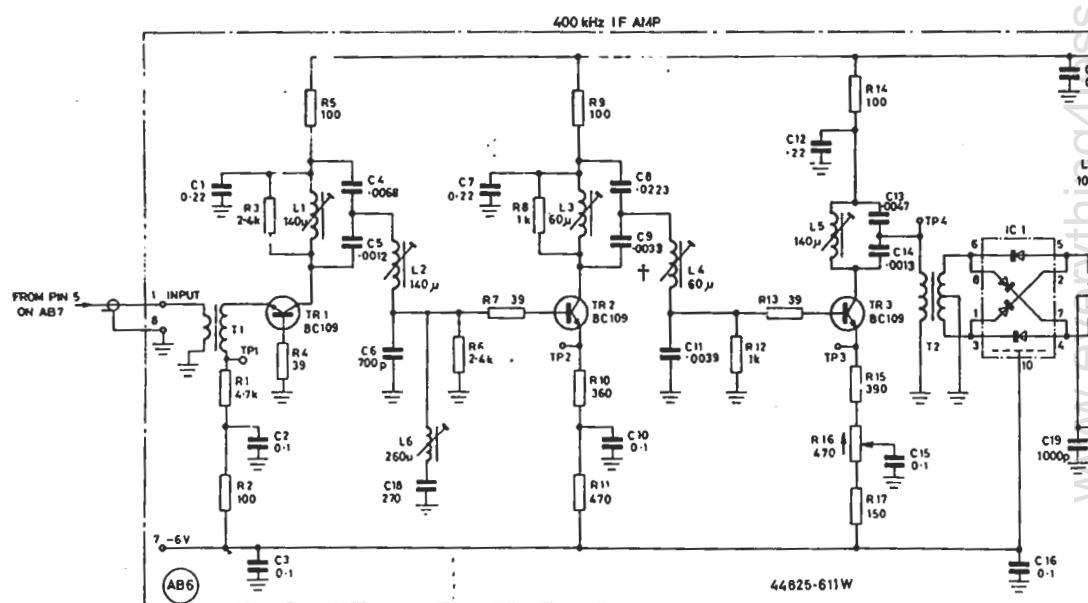
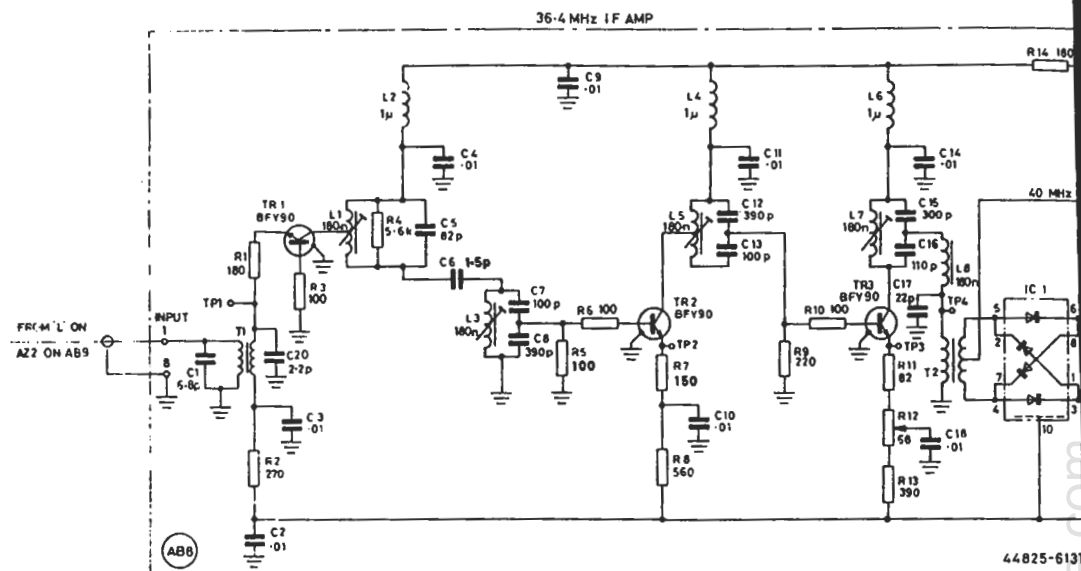
DRG N° Z44825-611W ISSUE 10



† INDICATES LEAD ROUTED VIA REAR PANEL PL & SK  
SEE A01 P1

NOTE : SOME SCREW CORES ARE SEALED WITH  
WAX AND IF ADJUSTMENT IS NEEDED,  
TO AVOID DAMAGE TO THE CORE, IT  
IS NECESSARY TO REMOVE THE WAX.

Fig. 7.8 Circuits: AC6, AB6, AB7 and AB8



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## Waveforms for AB1, AB2, AB3 and AB4

**Note** Probe connections and earth leads should be as short as possible.

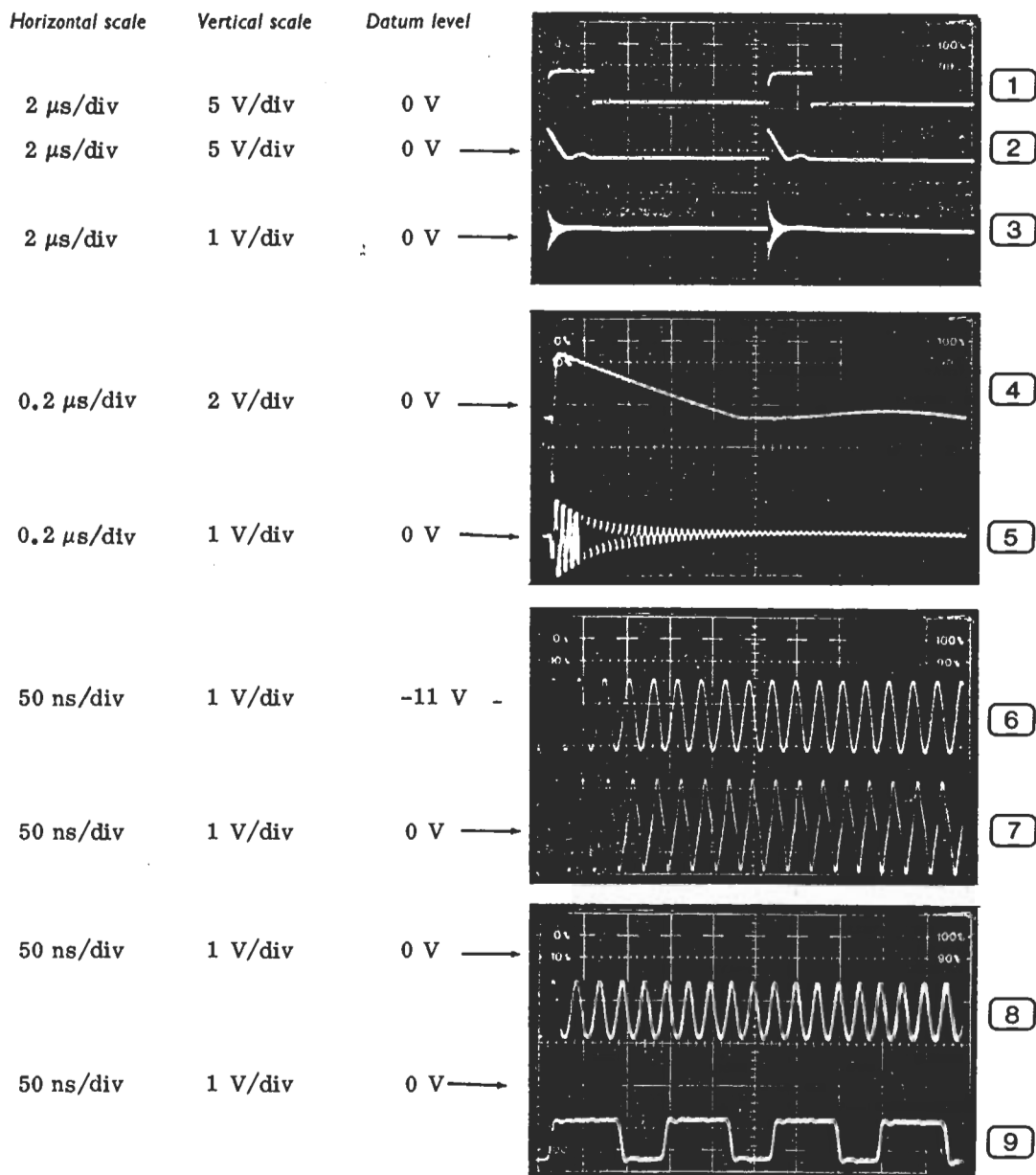
TF 2370 controls - HORIZONTAL SCALE and RANGE : 10 MHz/DIV

FILTER BANDWIDTH : WIDE

For (27), feed a 1 MHz 1 V p-p signal to the EXTERNAL STANDARD INPUT.

Oscilloscope triggering - (2) to (5) from (1) (a.c. positive)

(10) to (13) from (14) (a.c. positive)



10

11

12

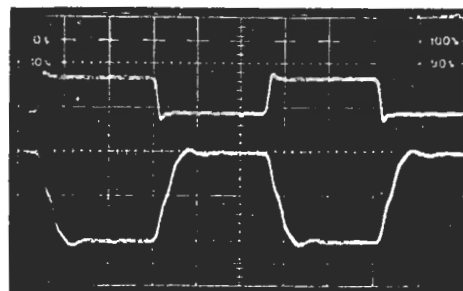
13

NOT  
USED

50 ns/div

1 V/div

0 V →

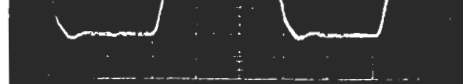


14

50 ns/div

1 V/div

0 V →

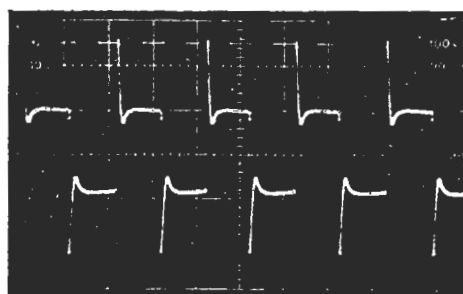


15

1 μs/div

1 V/div

0 V →

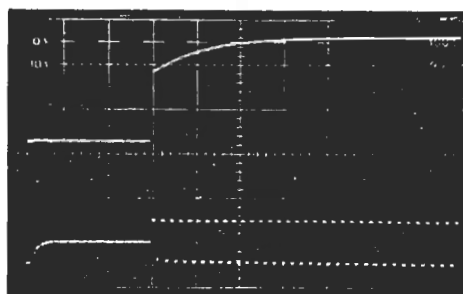


16

10 μs/div

1 V/div

0 V →

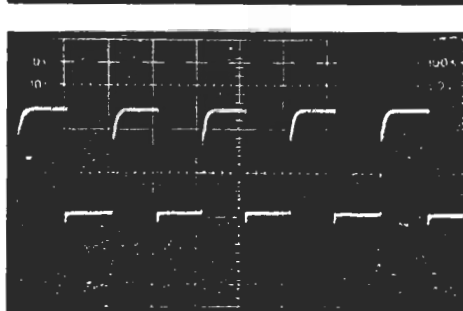


17

10 μs/div

1 V/div

0 V →

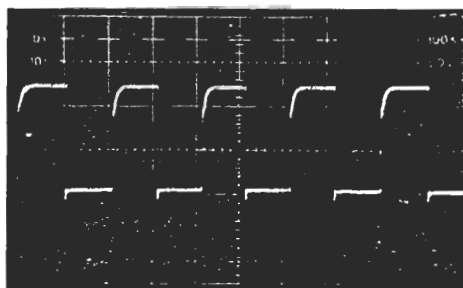


18

1 μs/div

2 V/div

0 V →

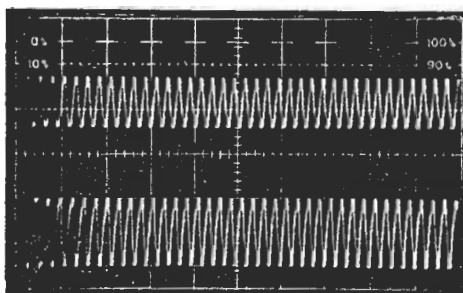


19

50 ns/div

1 V/div

-9 V →



20

50 ns/div

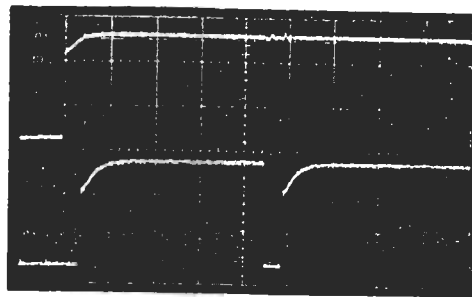
1 V/div

4 V →



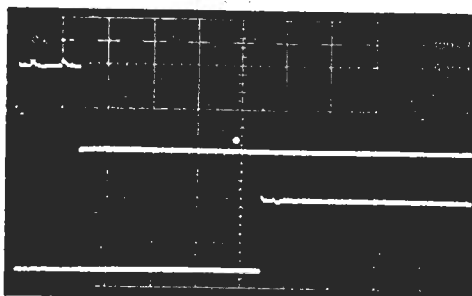
21

5  $\mu$ s/div      2 V/div



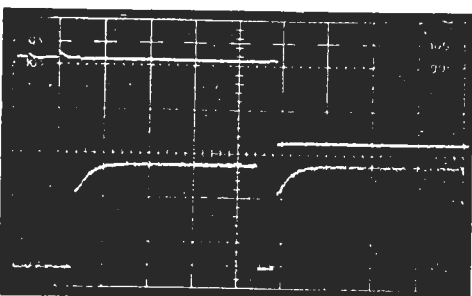
17

5  $\mu$ s/div      2 V/div



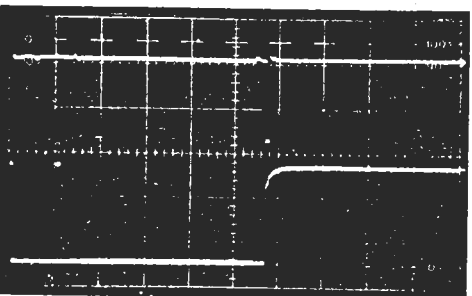
18

5  $\mu$ s/div      2 V/div



19

5  $\mu$ s/div      2 V/div



20

5  $\mu$ s/div      2 V/div



21

5  $\mu$ s/div      2 V/div



22

5  $\mu$ s/div      2 V/div



23

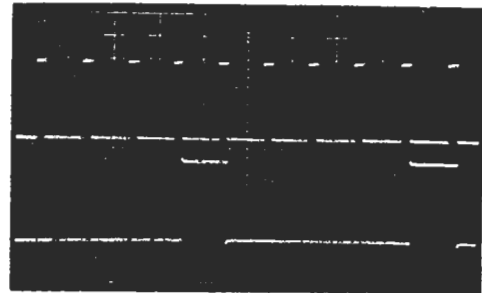
5  $\mu$ s/div      2 V/div



24

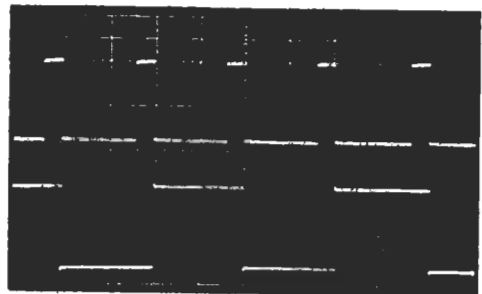


0.2 ms/div 2 V/div



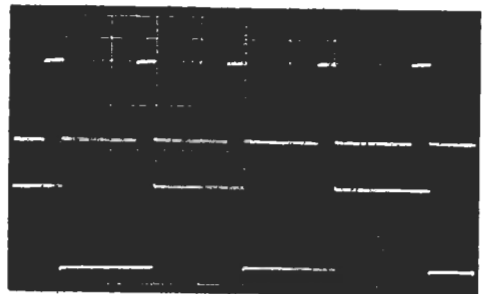
8

0.2 ms/div 2 V/div



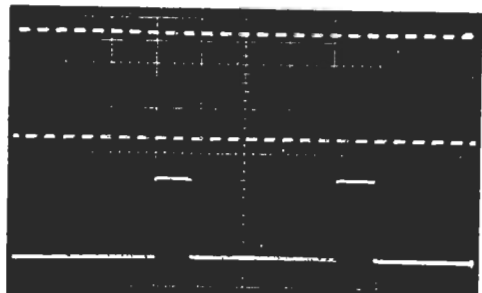
9

0.5 ms/div 2 V/div



10

0.5 ms/div 2 V/div



11

5 ms/div

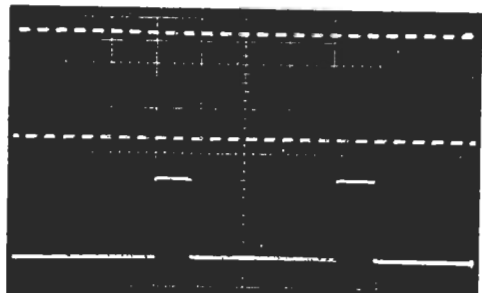
50 ms/div

0.5 s/div

50 μs/div

0.5 ms/div

2 V/div



12

5 ms/div

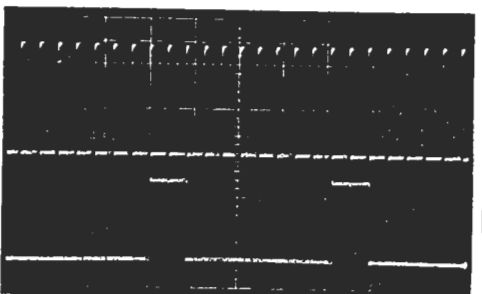
50 ms/div

0.5 s/div

50 μs/div

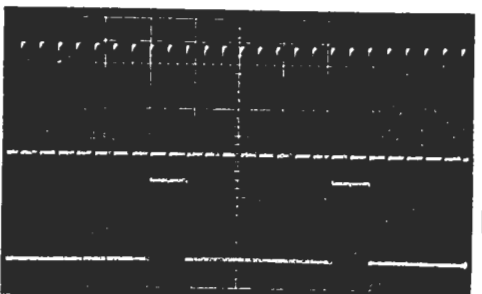
0.5 ms/div

2 V/div



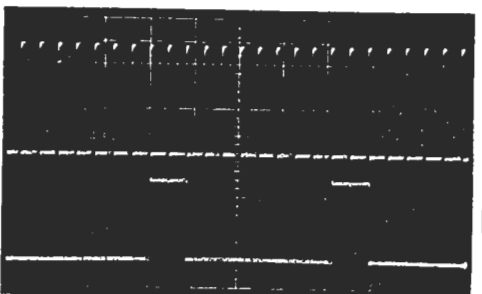
13

5 μs/div 2 V/div



14

10 μs/div 2 V/div



15

16

17

18

19

20

21

22

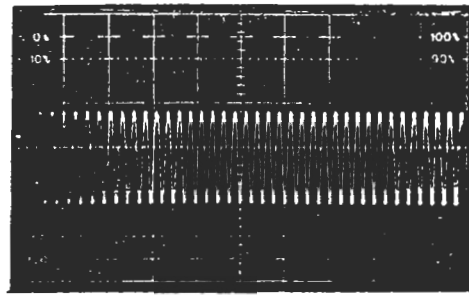
23

NOT  
USED

50 ns/div

0.5 V/div

3 V →

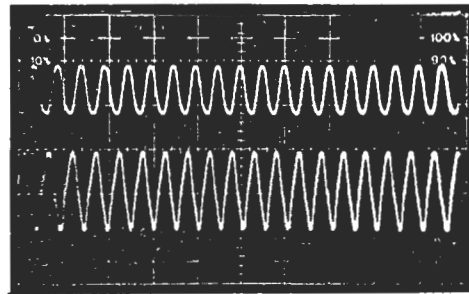


22

50 ns/div

1 V/div

0 V →

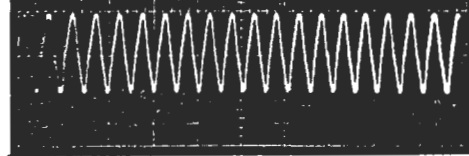


23

50 ns/div

1 V/div

0 V →

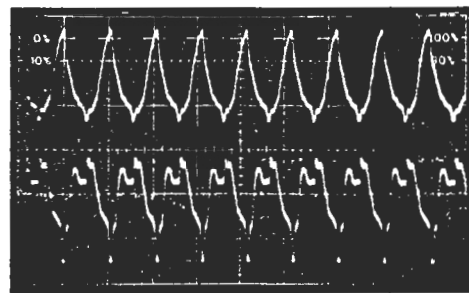


24

0.1 μs/div

0.2 V/div

-2 V →

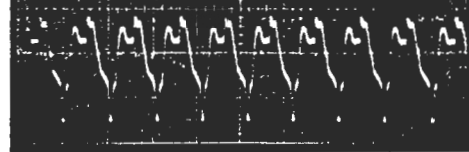


25

0.1 μs/div

0.2 V/div

0 V →

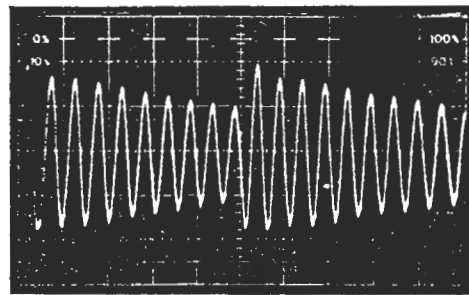


26

0.2 μs/div

0.1 V/div

0 V -

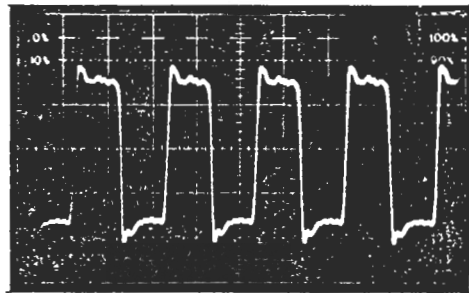


27

50 ns/div

0.2 V/div

-3 V

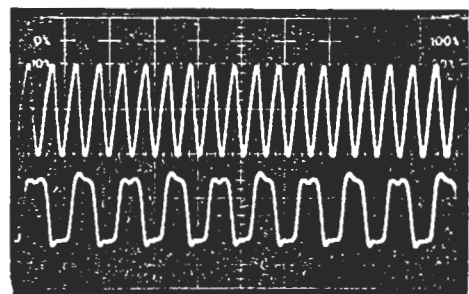


28

50 ns/div

0.5 V/div

-1 V →

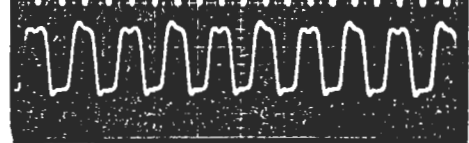


29

50 ns/div

0.5 V/div

-1 V →

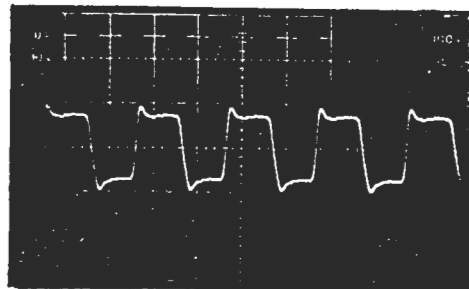


30

50 ns/div

0.5 V/div

0 V →

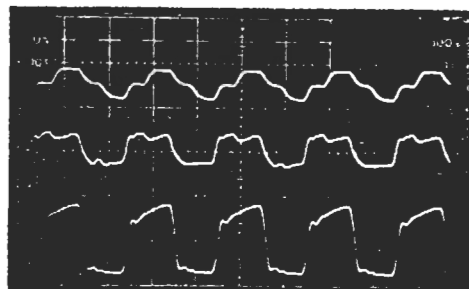


31

50 ns/div

0.5 V/div

0 V →

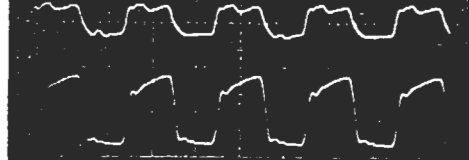


32

50 ns/div

0.5 V/div

0 V →

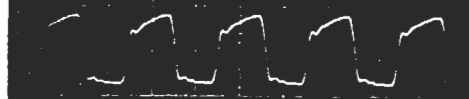


33

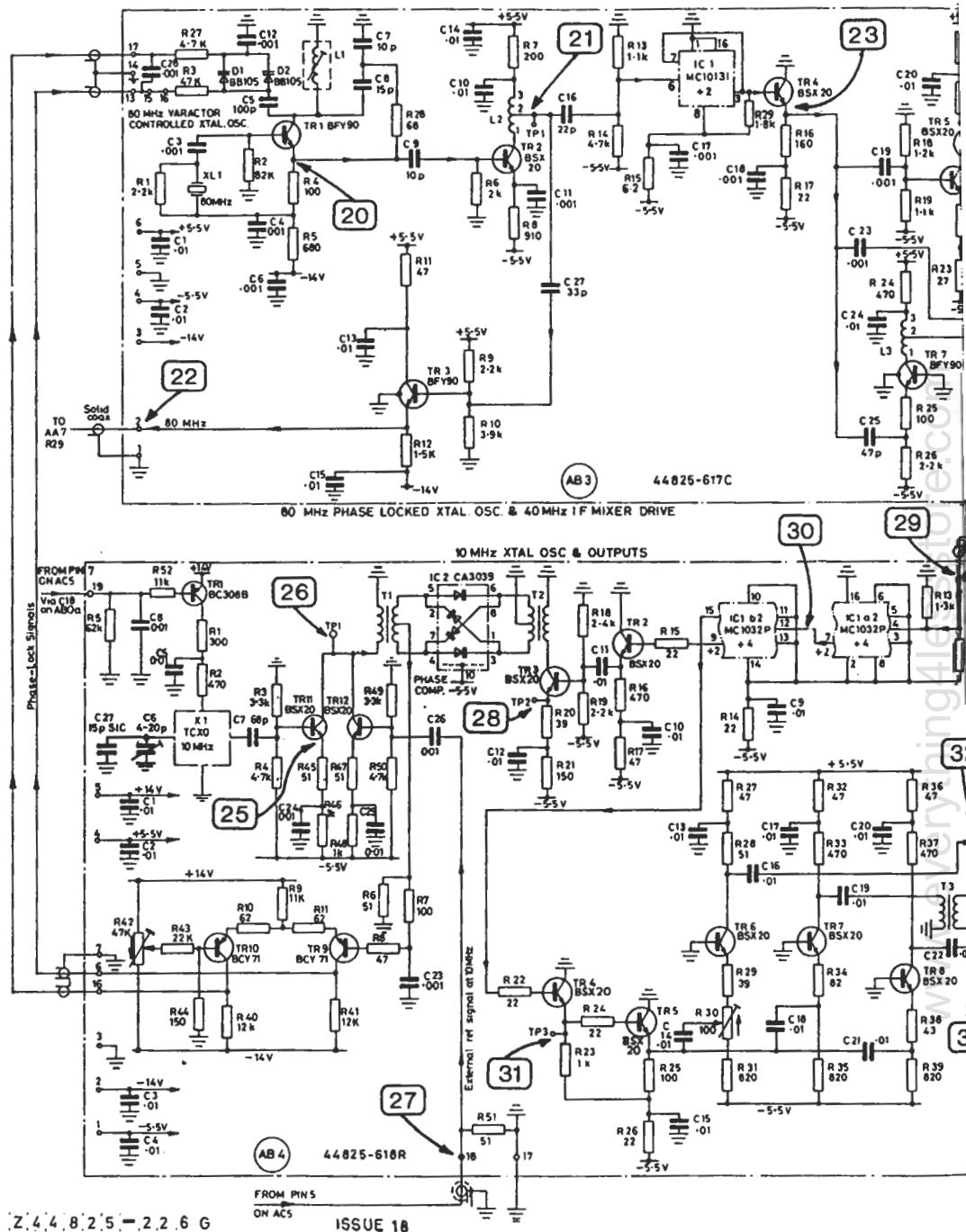
50 ns/div

0.5 V/div

0 V →



34



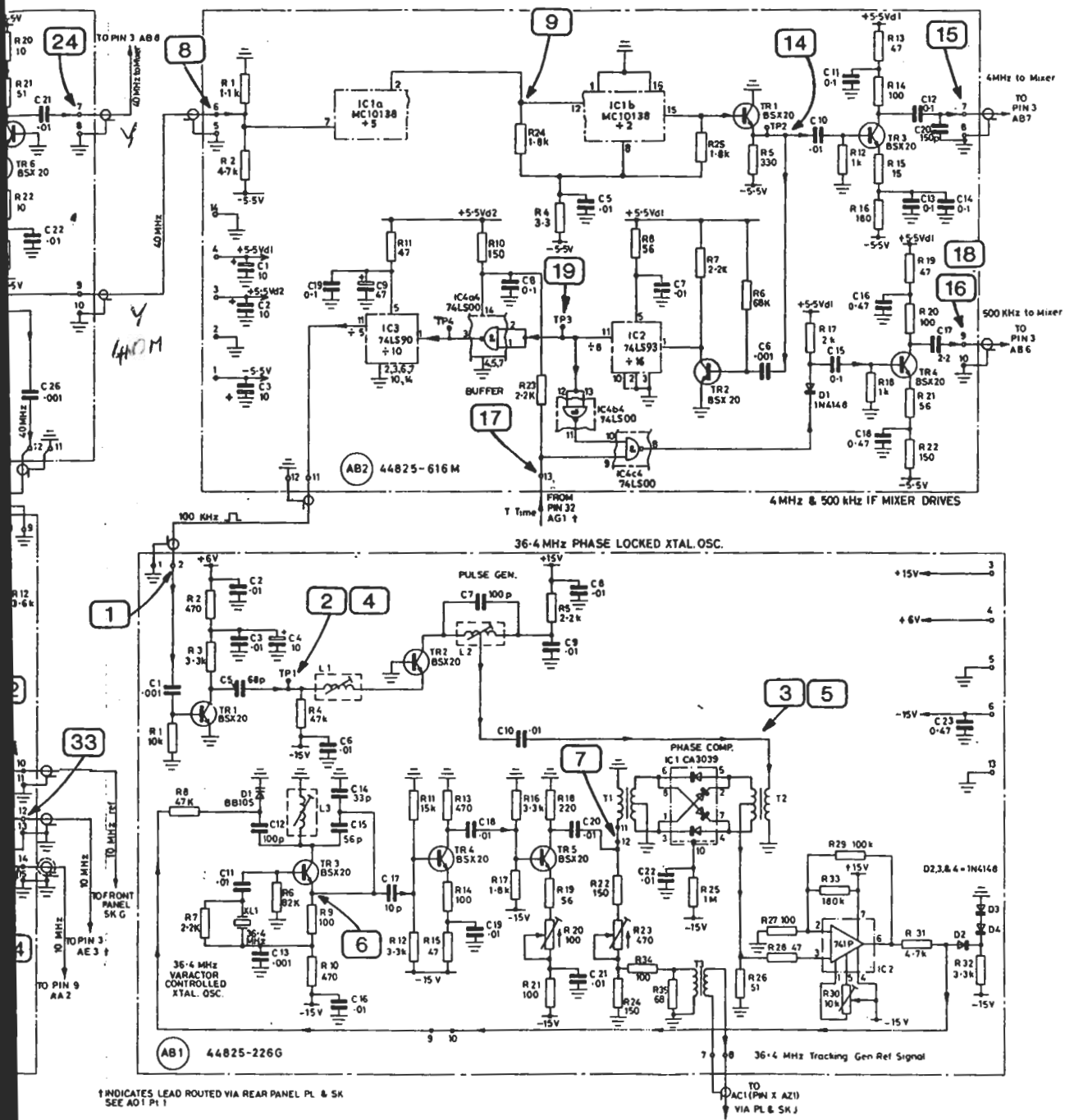


Fig. 7.9 Circuits: AB1, AB2, AB3 and AB4

## Waveforms for AA1

**Note** Probe connections and earth leads should be as short as possible.

TF 2370 controls - SWEEP MODE : AUTO

HORIZONTAL SCALE and RANGE : (1) to (5) 10 MHz/DIV  
(6) 10 kHz/DIV

FILTER BANDWIDTH : WIDE

REFERENCE FREQUENCY : (1) to (5) LH  
(6) CENTRE

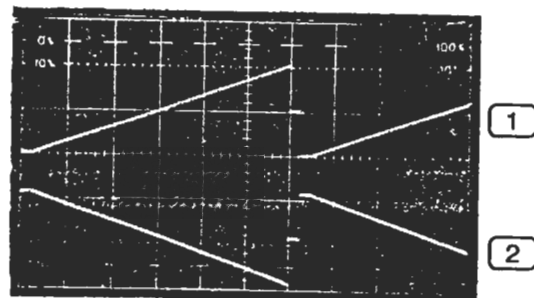
REFERENCE FREQUENCY 0-110 MHz : Fully counter-clockwise

REFERENCE FREQUENCY  $\pm 70$  kHz : Fully counter-clockwise

Horizontal scale      Vertical scale      Datum level

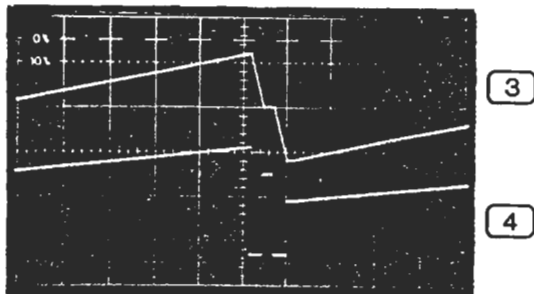
20 ms/div      5 V/div      0 V

20 ms/div      5 V/div      0 V

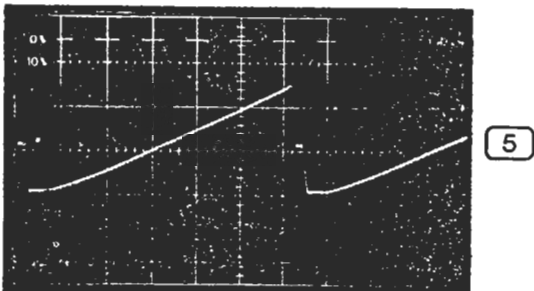


10 ms/div      5 V/div      0 V

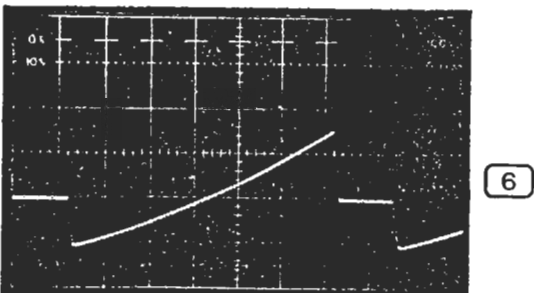
10 ms/div      10 V/div      0 V



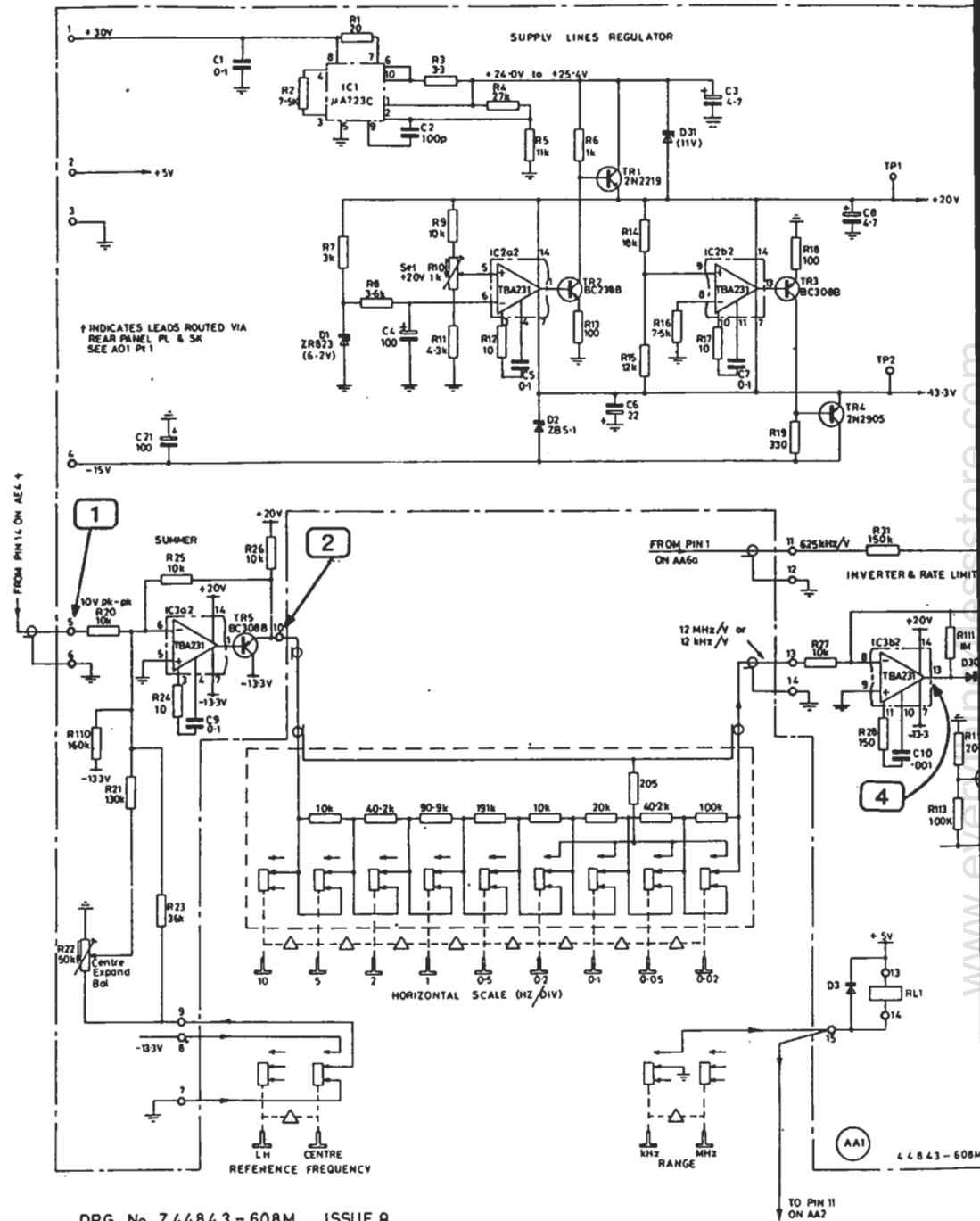
20 ms/div      5 V/div      0 V

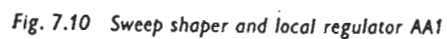


20 ms/div      1 V/div      0 V



ewise  
ise



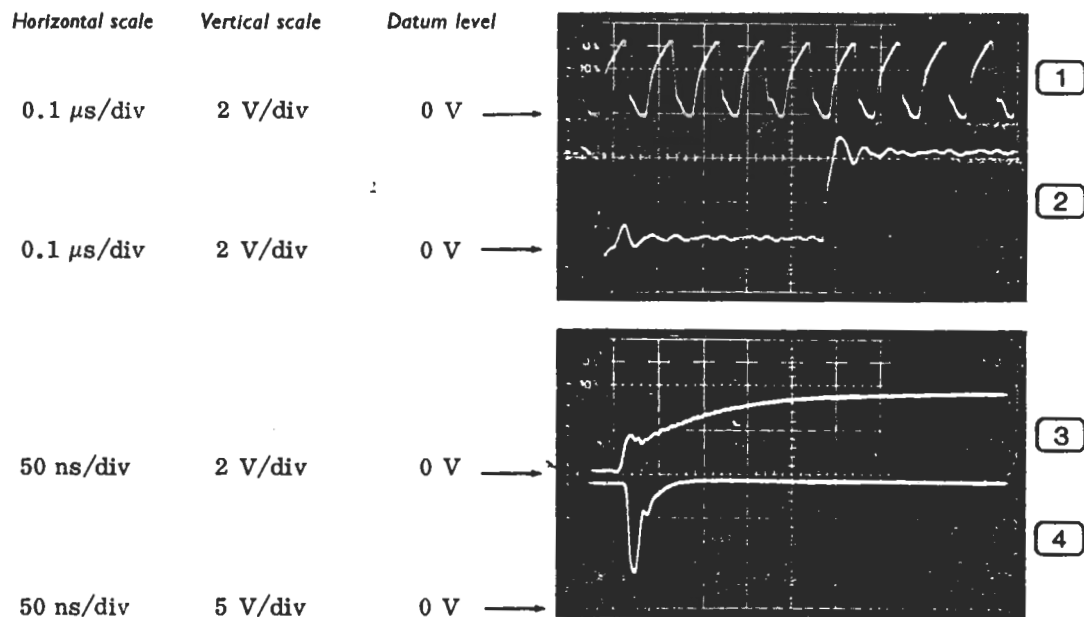


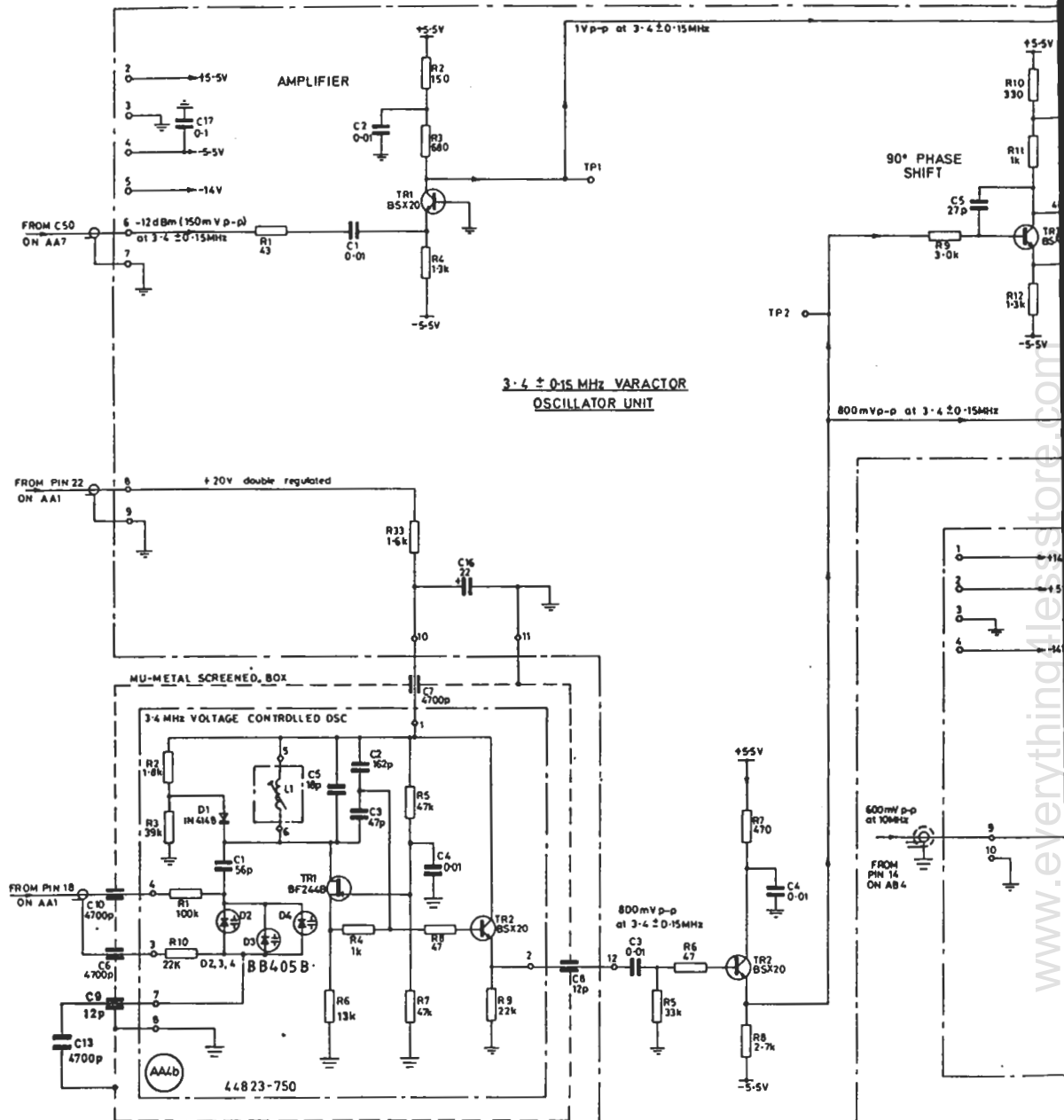


## Waveforms for AA2 and AA4

**Note** Probe connections and earth leads should be as short as possible.

TF 2370 controls - SWEEP MODE : AUTO  
HORIZONTAL SCALE and RANGE : 10 MHz/DIV  
FILTER BANDWIDTH : WIDE





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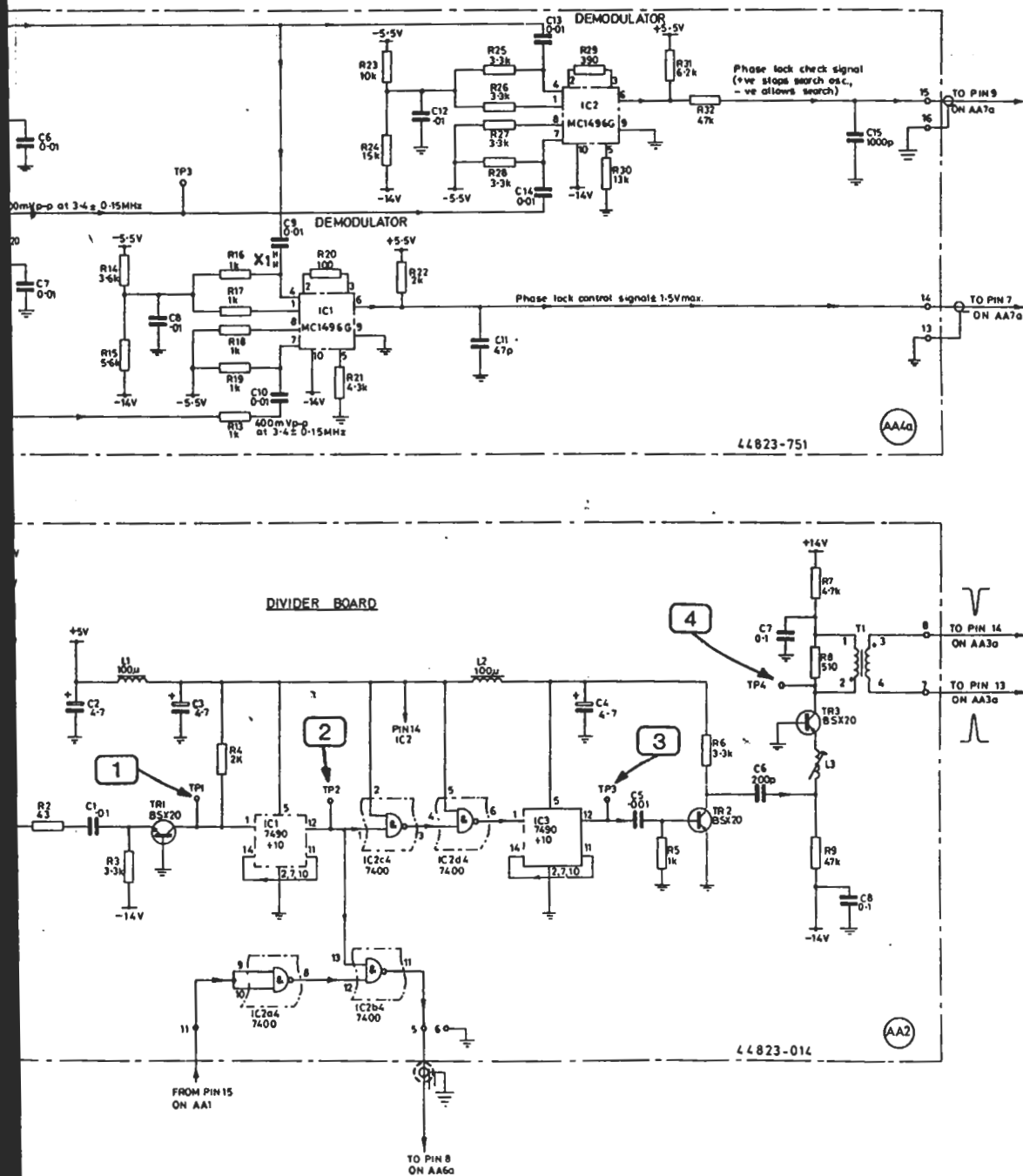


Fig. 7.11 Circuits: AA2, AA4

### Waveforms for AA3

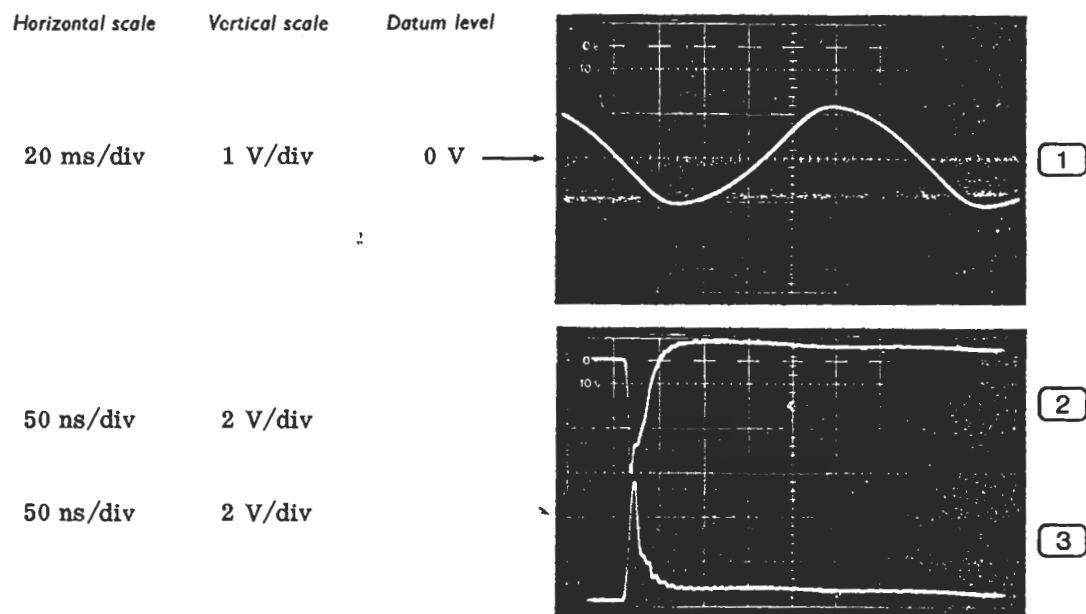
**Note** Probe connections and earth leads should be as short as possible.

TF 2370 controls - SWEEP MODE : AUTO

HORIZONTAL SCALE and RANGE : 10 MHz/DIV

FILTER BANDWIDTH : WIDE

For (1), connect TP5 to earth.





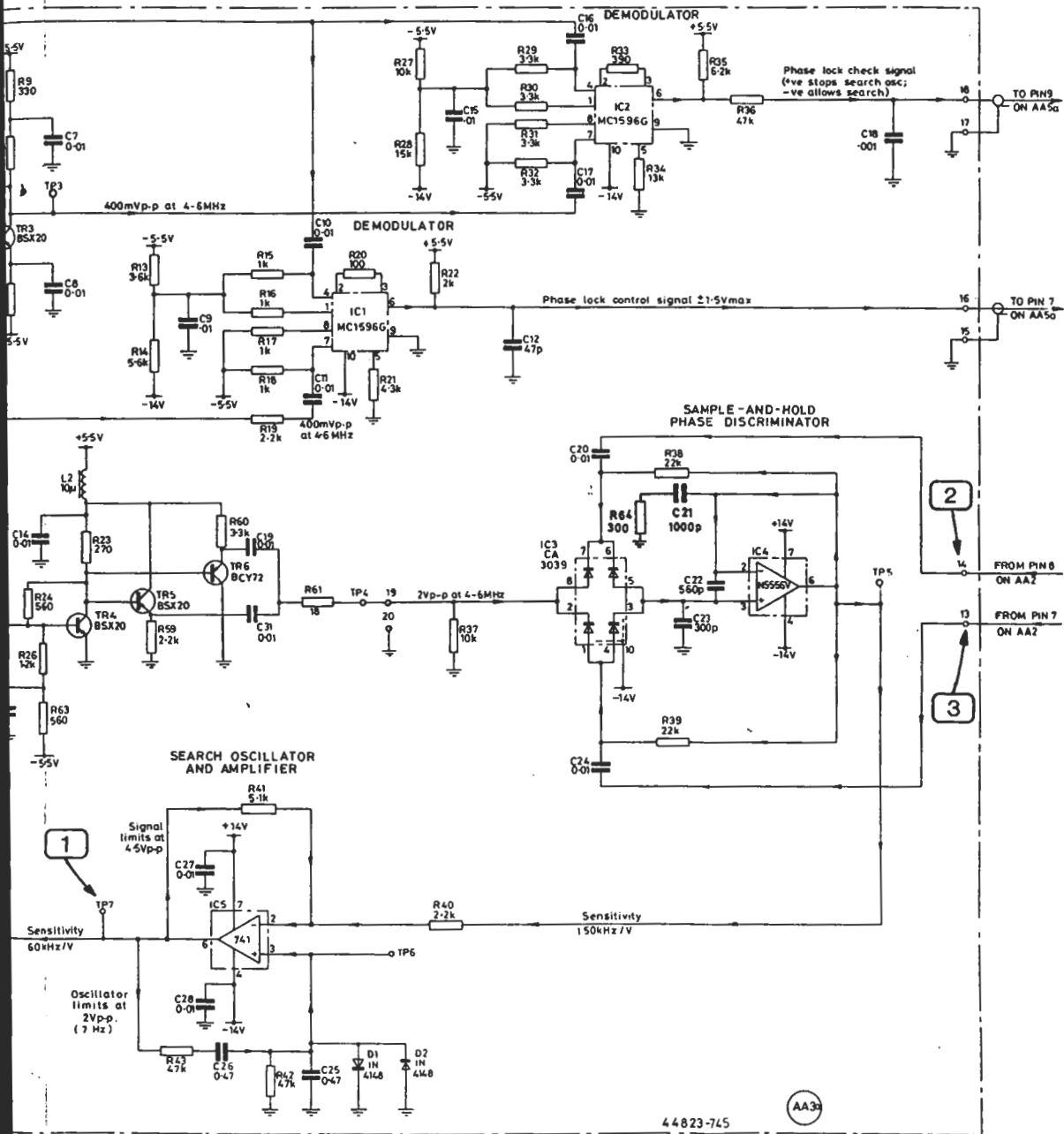
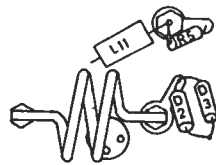
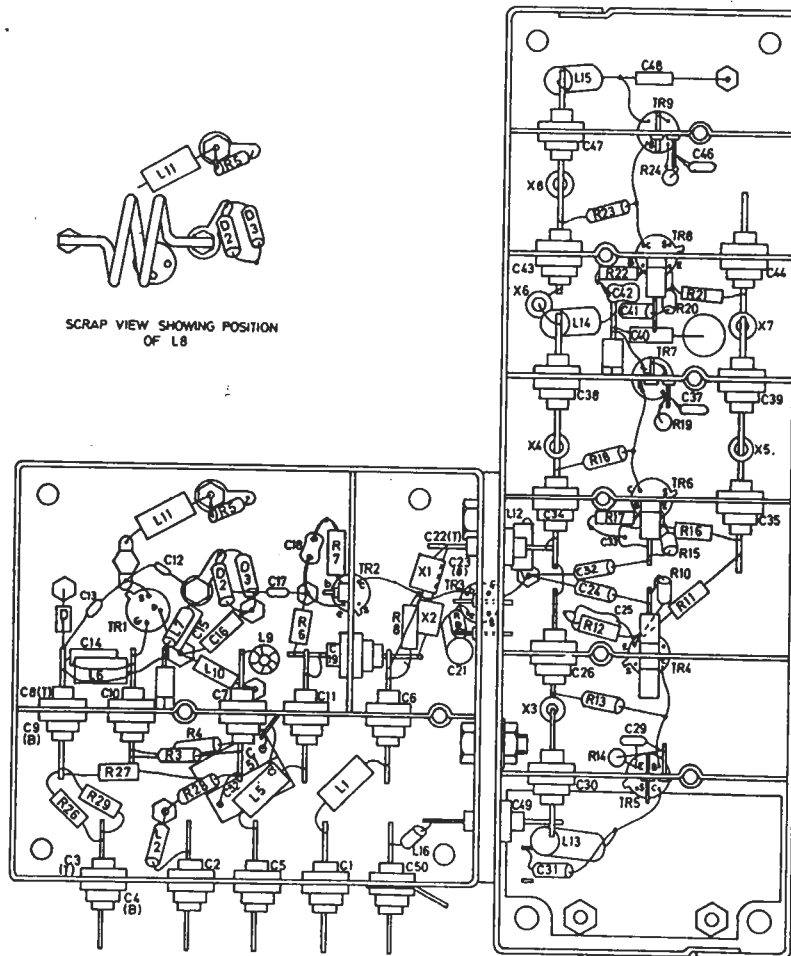


Fig. 7.12 4.8 MHz interpolation oscillator AA3

Layout of AA5



SCRAP VIEW SHOWING POSITION OF L8



TPC 3096

## Waveforms for AA5

**Note** Probe connections and earth leads should be as short as possible.

TF 2370 controls - SWEEP MODE : AUTO

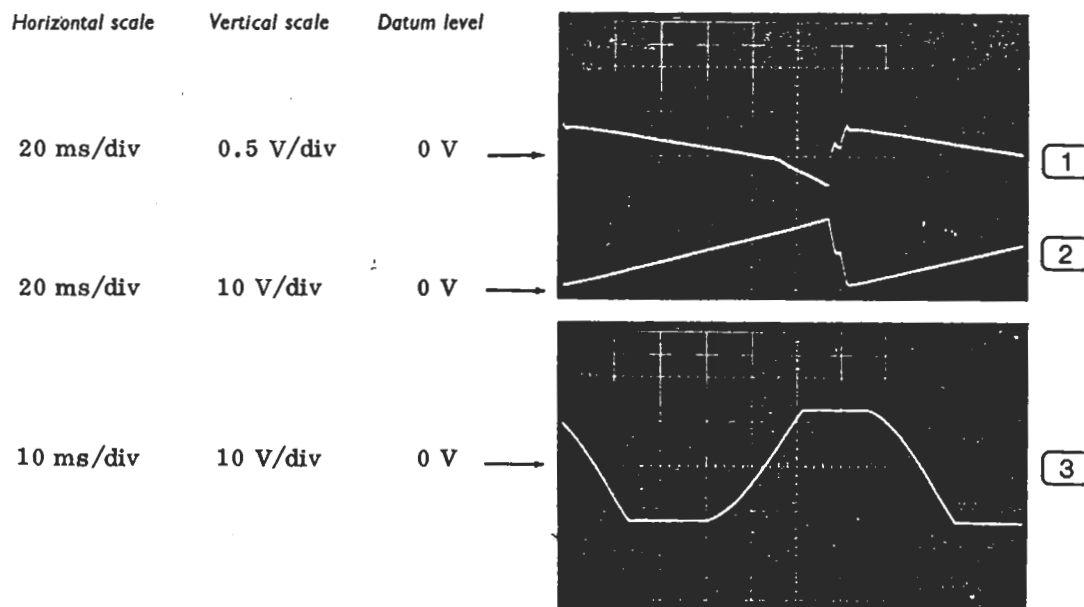
HORIZONTAL SCALE and RANGE : 10 MHz/DIV

FILTER BANDWIDTH : WIDE

REFERENCE FREQUENCY : LH

REFERENCE FREQUENCY 0-110 MHz : One half turn clockwise

For (3), connect pin 9 to earth.





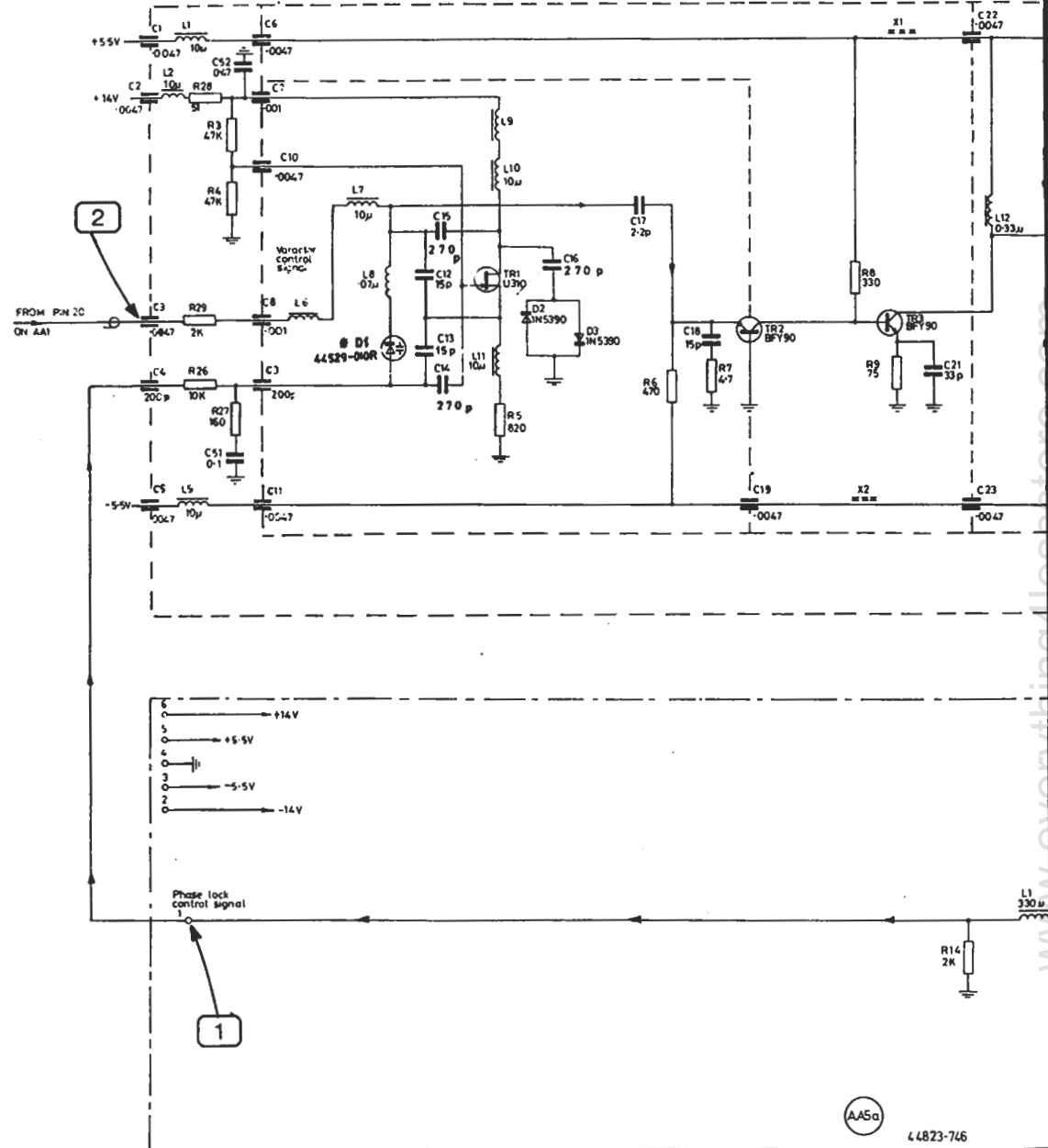
wise

\* D1 is one of a matched pair. The other is fitted in a similar position on AA6.

200-310 MHz VARACTOR  
CONTROLLED OSCILLATOR

357-500

BUFFER



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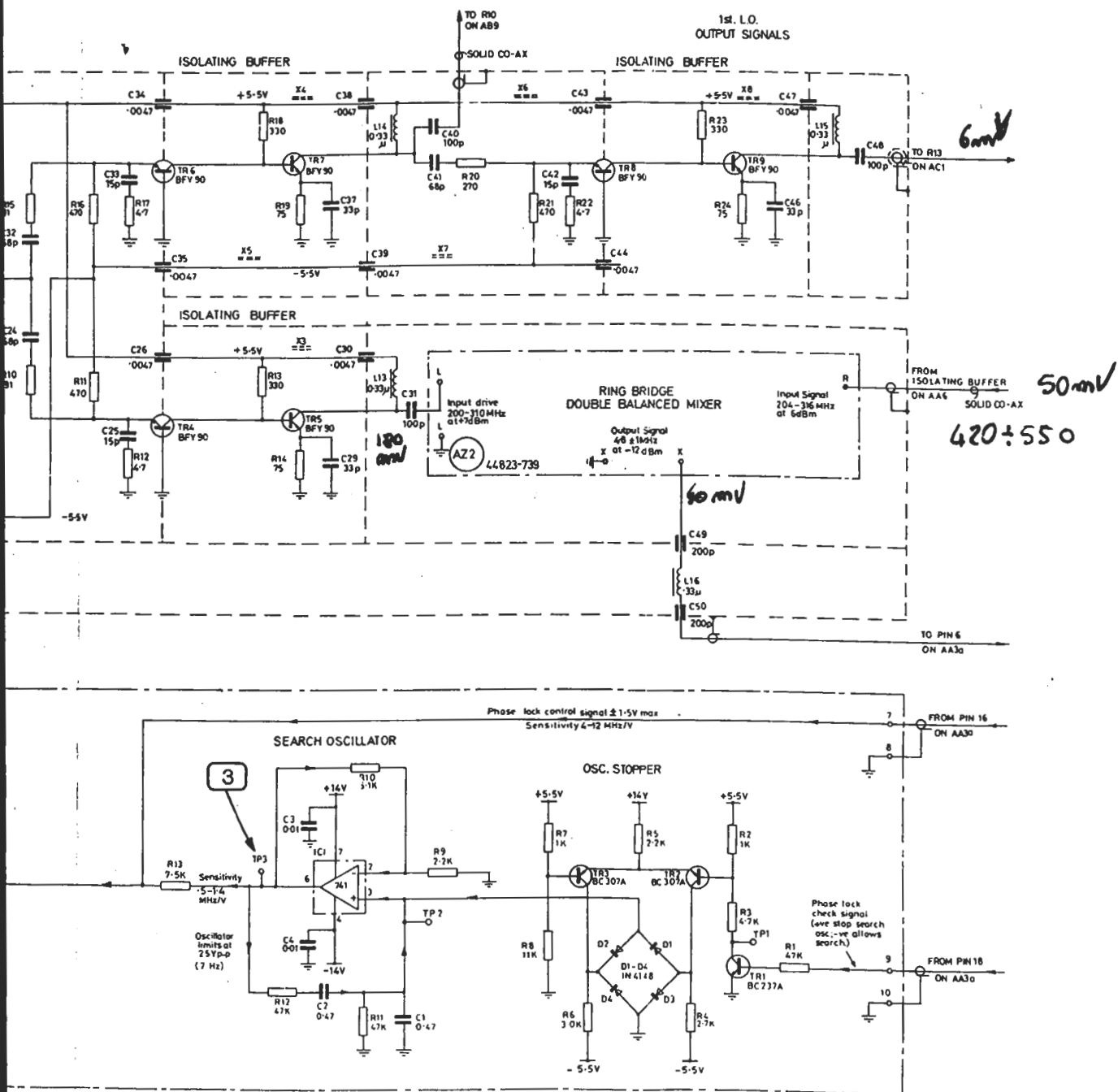


Fig. 7.13 200 to 310 MHz slave first local oscillator AAS

## Waveforms for AA6

**Note** Probe connections and earth leads should be as short as possible.

TF 2370 controls - SWEEP MODE : (1) to (5) AUTO

(6) to (8) MANUAL

HORIZONTAL SCALE and RANGE : (1) to (5) 10 MHz/DIV

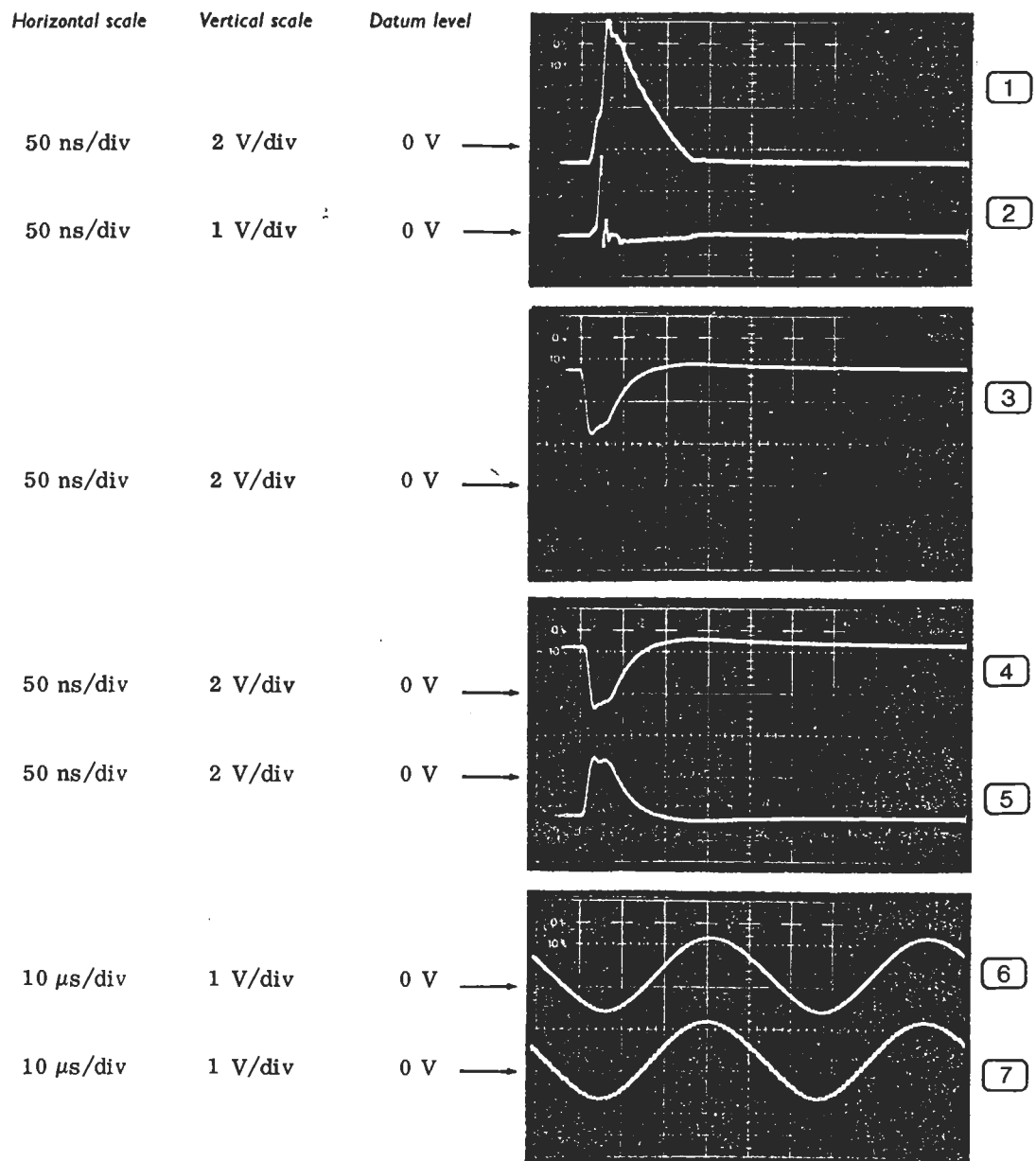
(6) to (8) 10 kHz/DIV

FILTER BANDWIDTH : WIDE

REFERENCE FREQUENCY 0-110 MHz : For (6) and (7),  
adjusted to give a maximum amplitude sine wave

For (6) and (7), connect pin 1 on AA6a to earth.

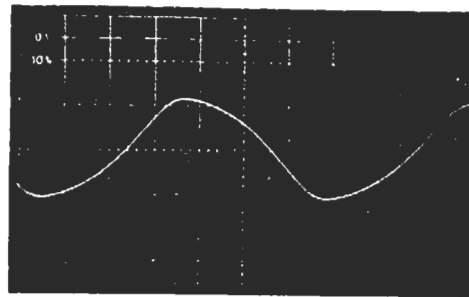
For (8), connect TP2 on AA6a to earth.



10,ms/div

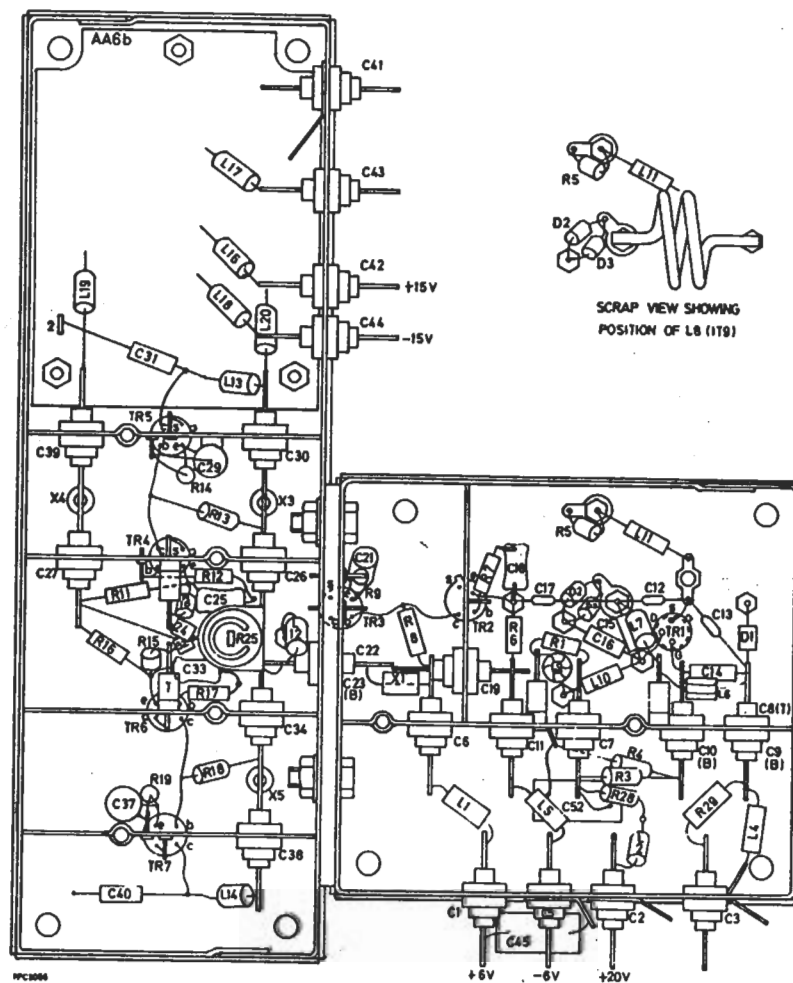
1 V/cm

0 V →



8

Layout for AA6

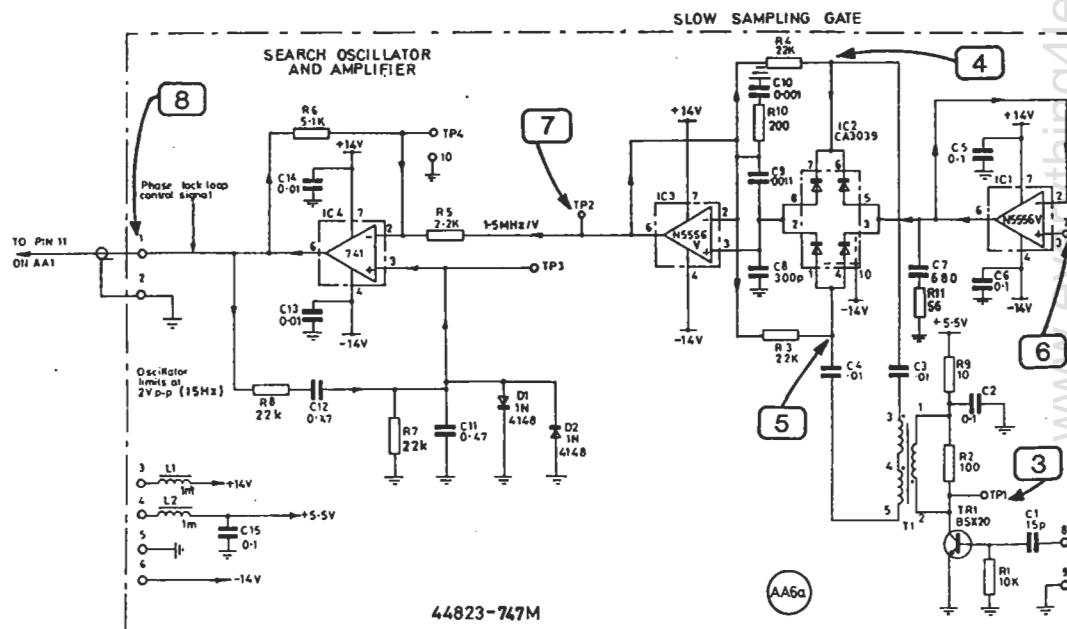
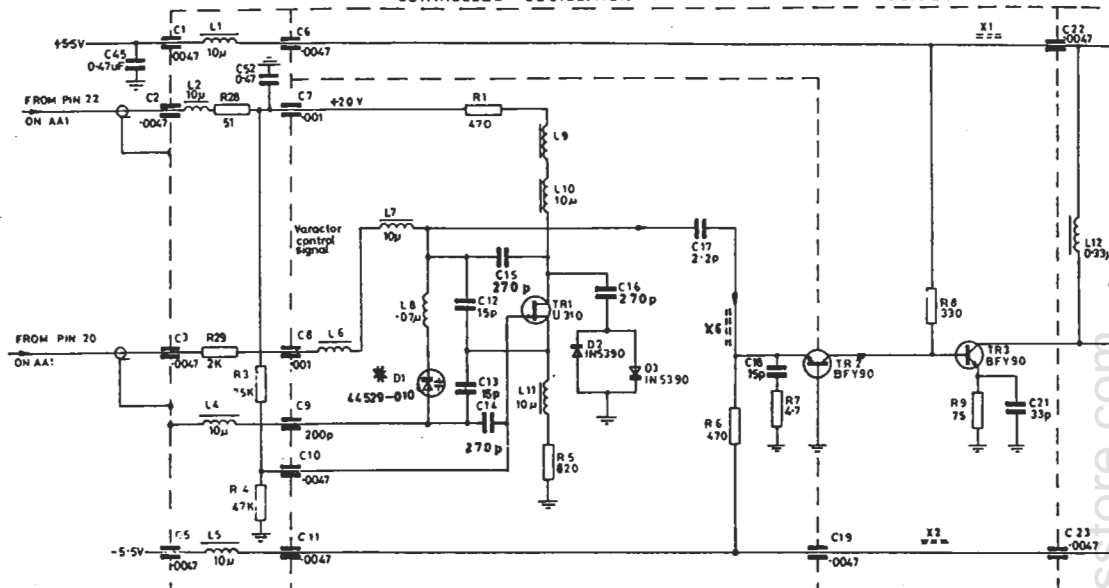


2370(1g)

\* D1 is one of a matched pair. The other is fitted in a similar position on AA5.

204 - 316 MHz VARACTOR  
CONTROLLED OSCILLATOR

381-553  
BUFFER



DRG No Z44990-071J

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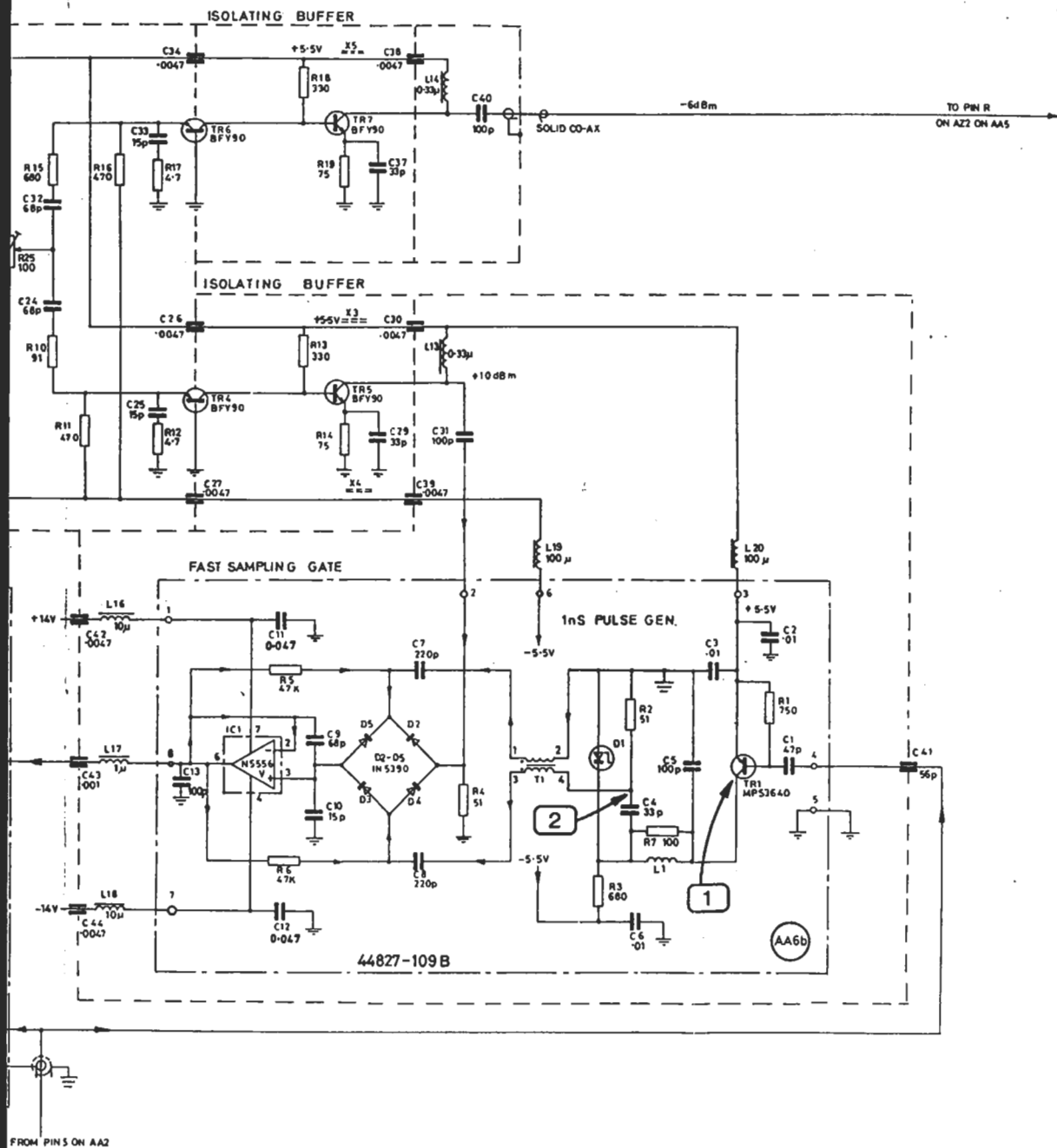
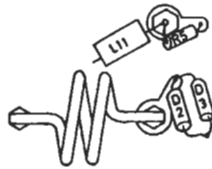
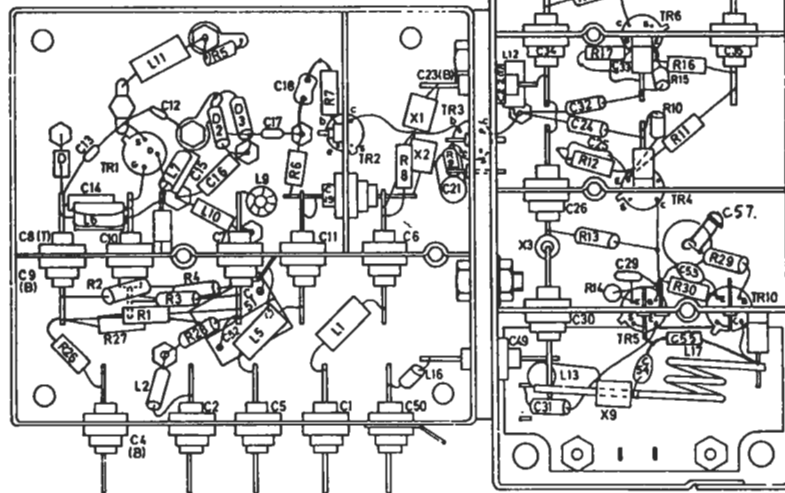


Fig. 7.14 205 to 315 MHz master first local oscillator AA6

Layout for AA7



SCRAP VIEW SHOWING POSITION OF L8



WPC300

## Waveforms for AA7

**Note** Probe connections and earth leads should be as short as possible.

TF 2370 controls - SWEEP MODE : AUTO

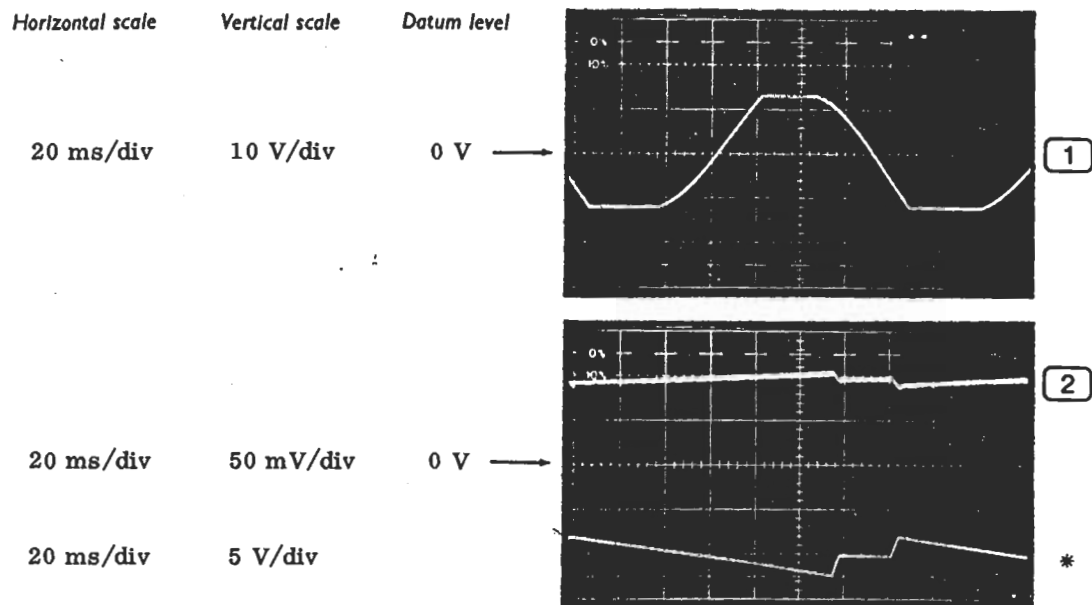
HORIZONTAL SCALE and RANGE : 10 kHz/DIV

FILTER BANDWIDTH : WIDE

REFERENCE FREQUENCY : LH

REFERENCE FREQUENCY  $\pm 70$  kHz : Fully counter-clockwise

For (1), connect pin 9 to earth.



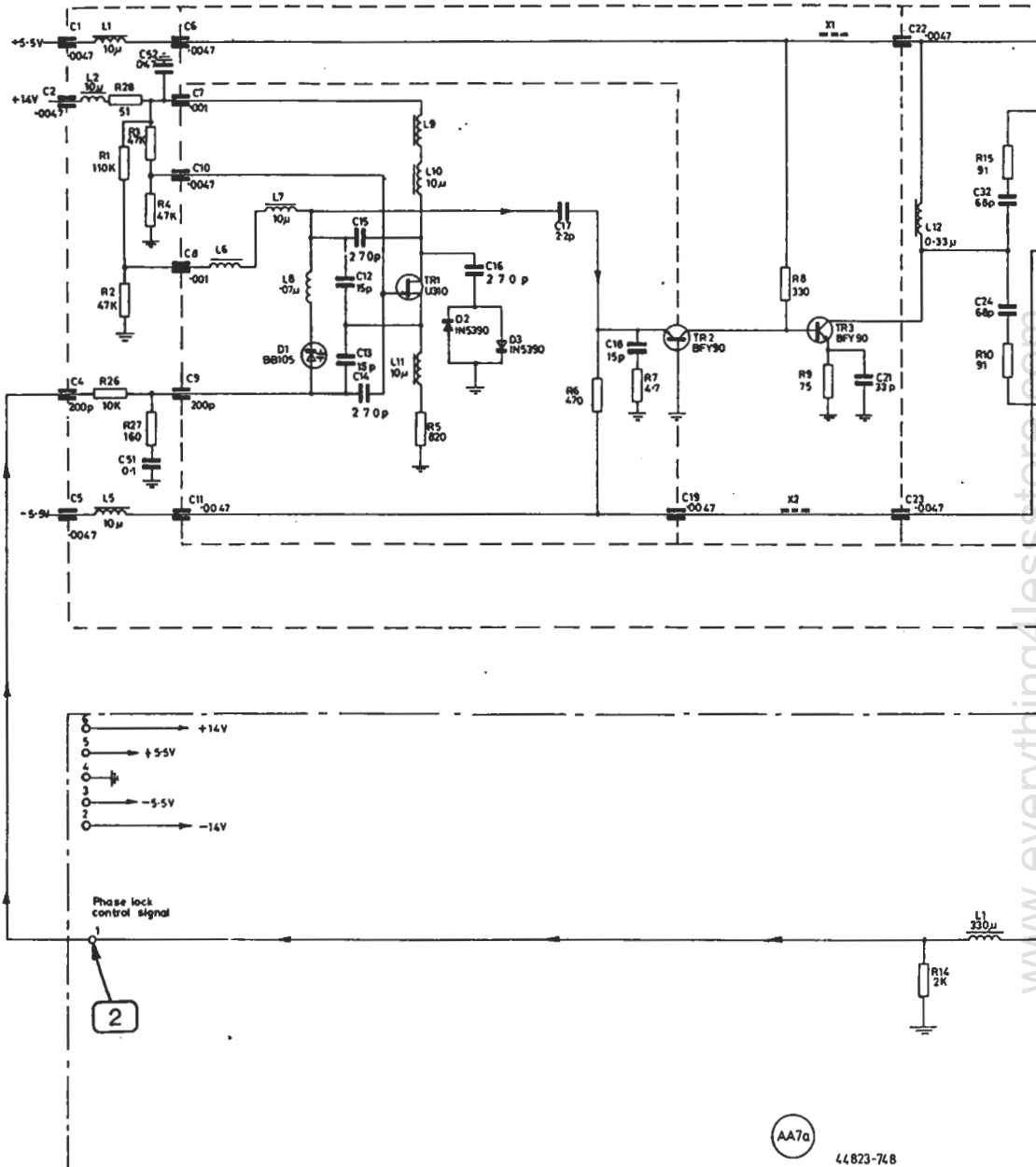
\* TP7 on AA1, for timing comparison



357-

236.6 ± 0.15MHz VARACTOR  
CONTROLLED OSCILLATOR

BUFFER



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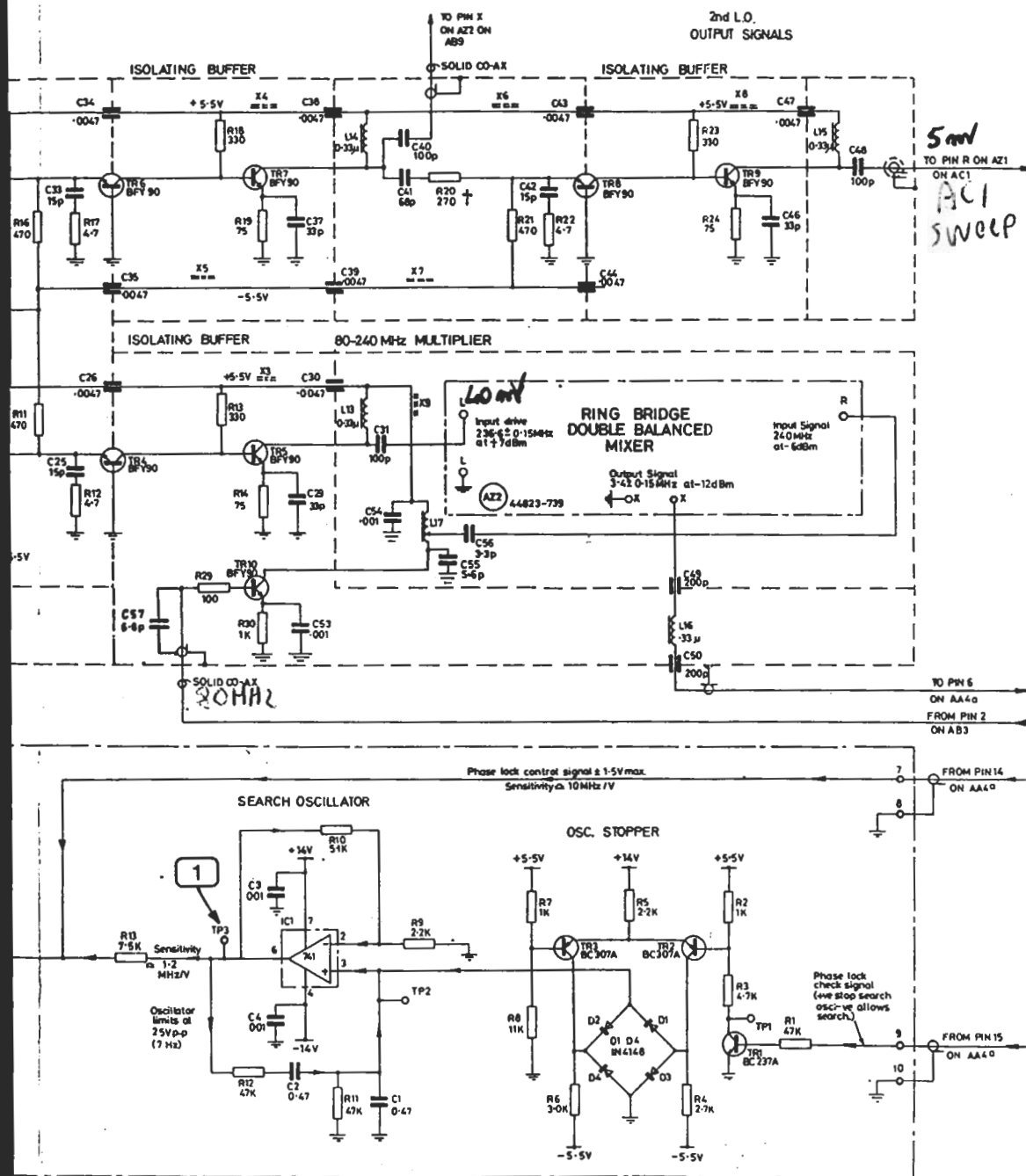


Fig. 7.15 236 MHz slave second local oscillator AA7

## Waveforms for AC5

TF 2370 controls - SWEEP MODE : (8) to (14) AUTO for preliminary adjustments and then MANUAL to display the waveforms

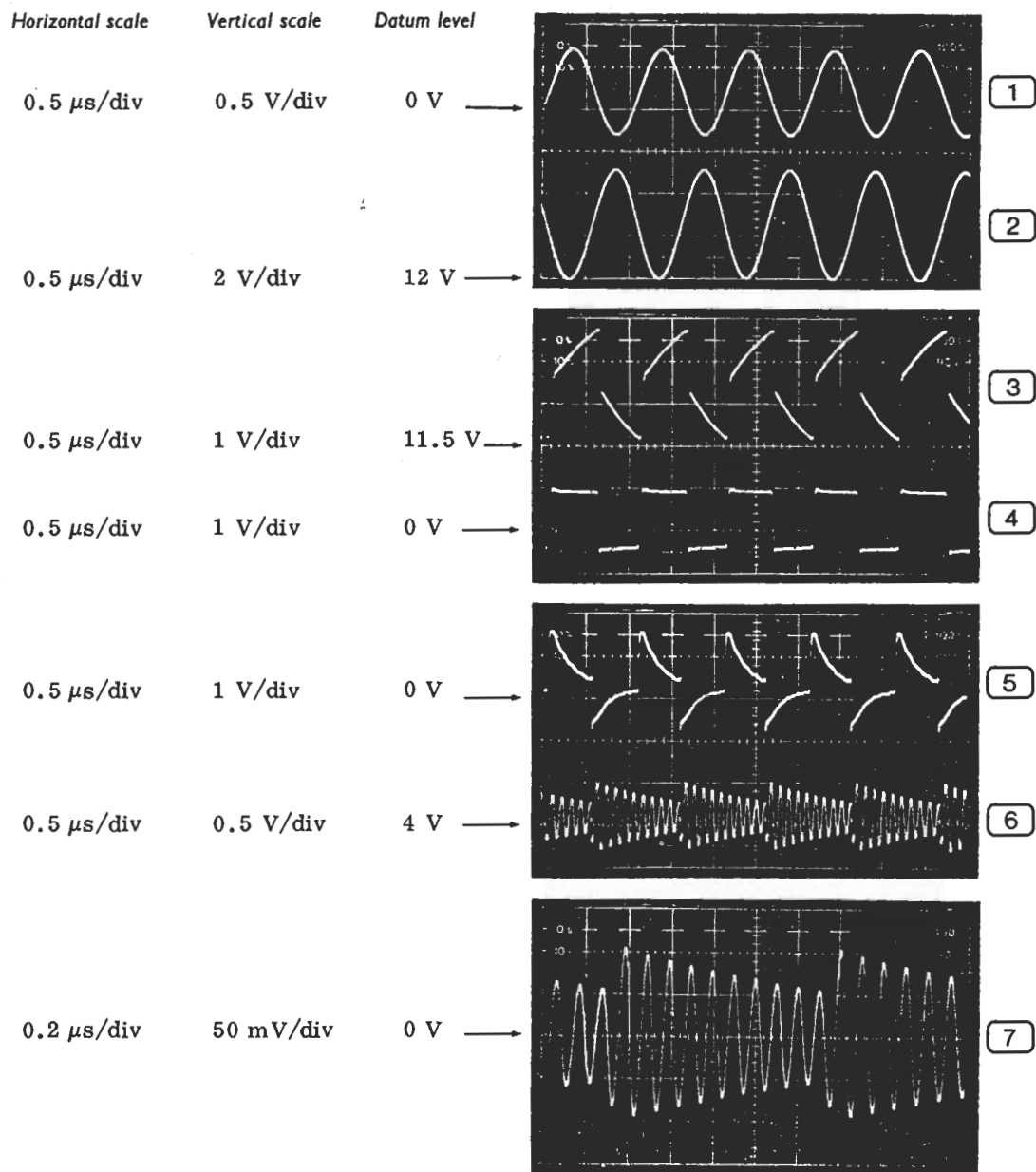
HORIZONTAL SCALE and RANGE : (8) to (14) 10 kHz/DIV

FILTER BANDWIDTH : (8) to (14) WIDE

VERTICAL SCALE and RANGE : (8) to (14) 0 dBm 1 dB/DIV

For (1) to (7), feed a 1 MHz (accuracy better than 1 in  $10^7$ ) 1 V p-p signal to the EXTERNAL STANDARD INPUT.

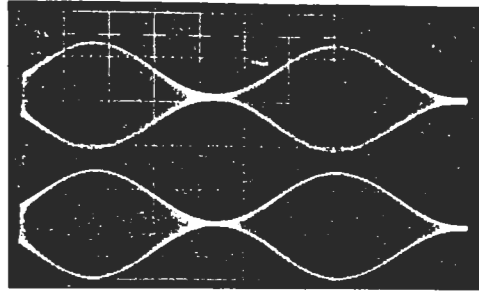
For (8) to (14), feed a 10 MHz signal to the INPUT. Adjust the signal level to give a display on the CATHODE RAY TUBE of the full height of the graticule. Then set the SWEEP MODE to MANUAL and adjust the BRIGHT LINE POSITION to the centre of the signal on display. Also amplitude modulate the 10 MHz signal at 1 kHz to 100% and load the DETECTED OUTPUT with 600  $\Omega$ .



0.2 ms/div

50 mV/div

14 V →

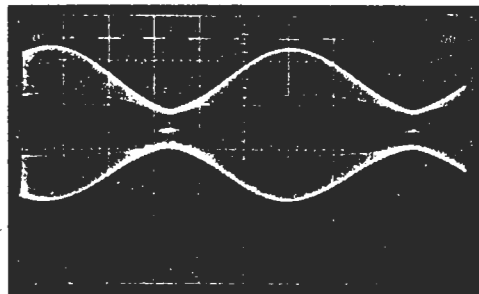


8

0.2 ms/div

1 V/div

9.5 V →

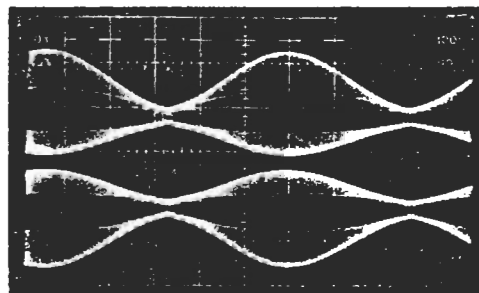


9

0.2 ms/div

2 V/div

0 V →

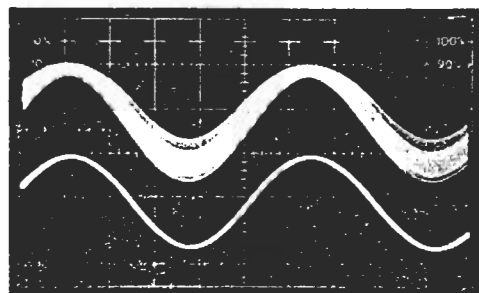


10

0.2 ms/div

2 V/div

0 V →



11

0.2 ms/div

2 V/div

0 V →

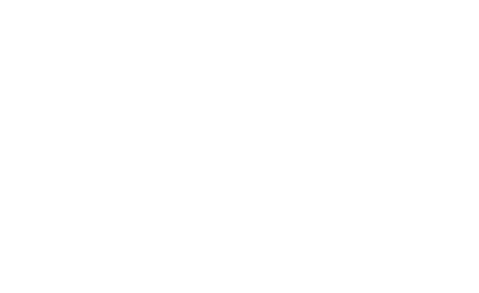


12

0.2 ms/div

2 V/div

0 V →



13

0.2 ms/div

1 V/div

0 V →



14

E

9

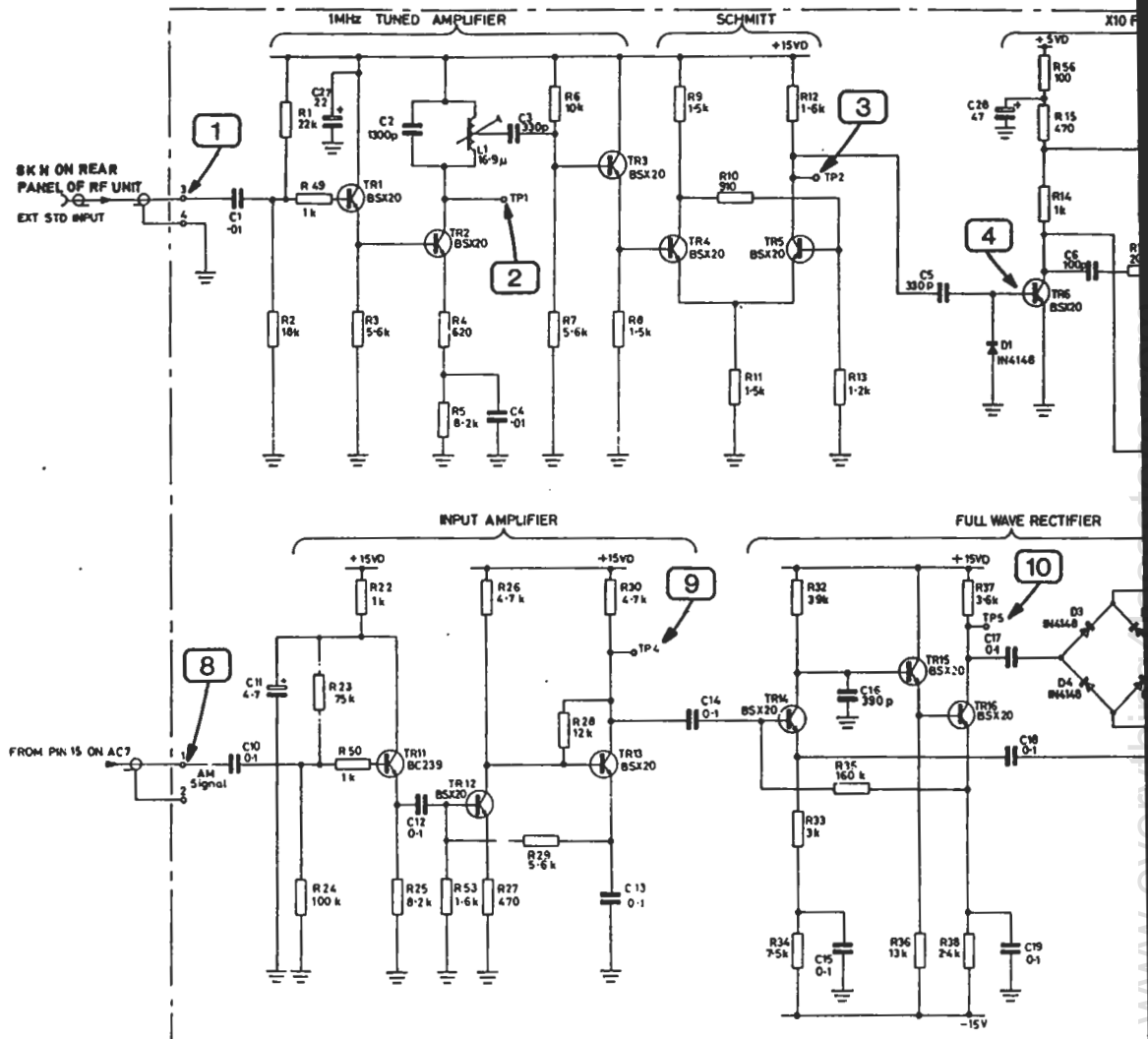
10

11

12

13

14



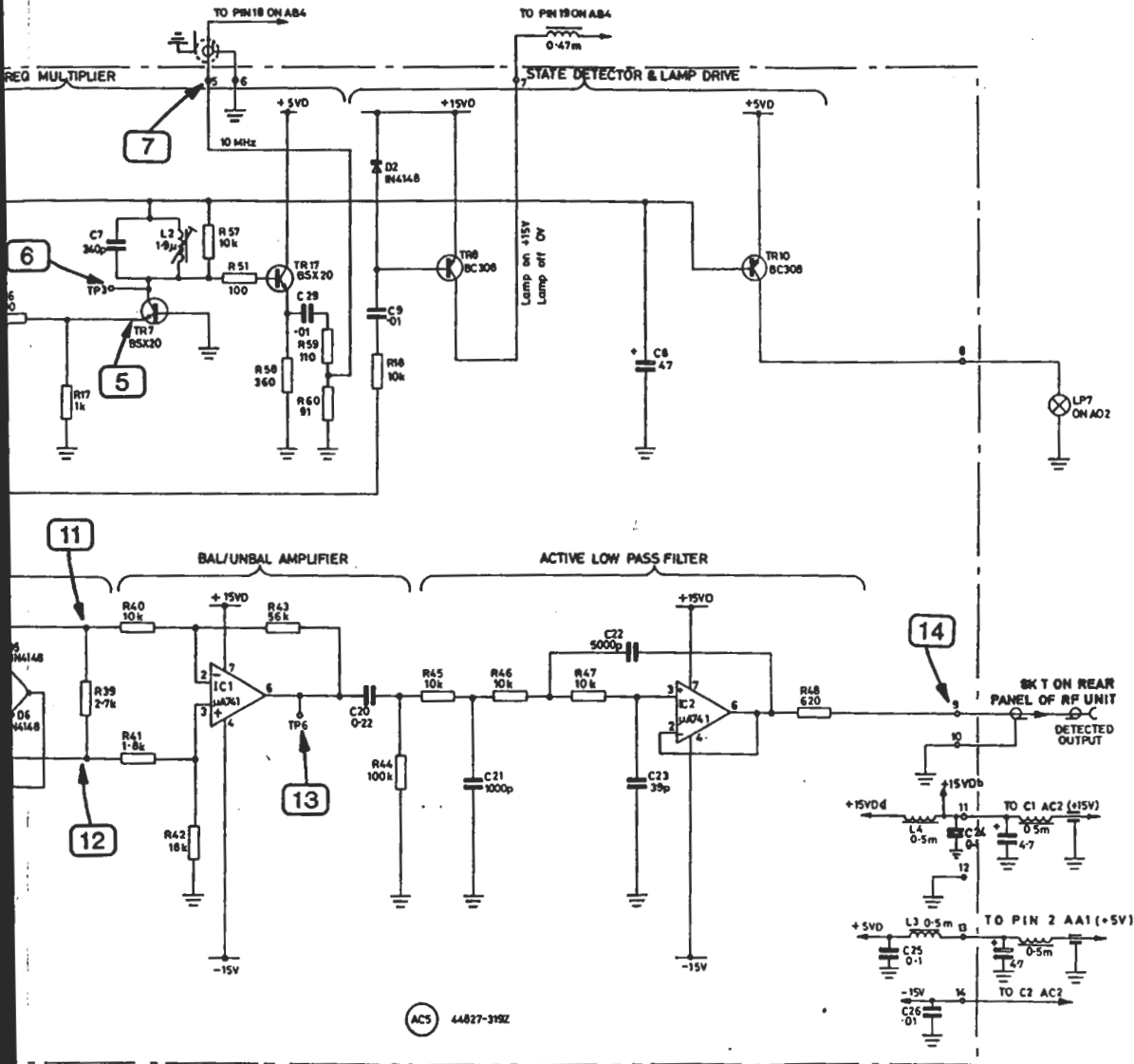


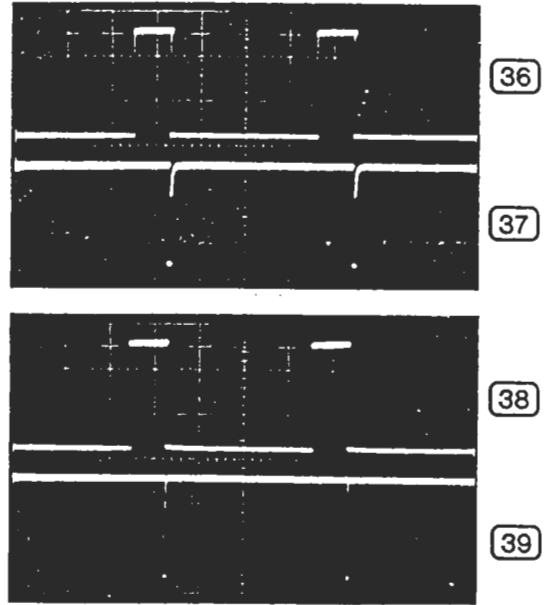
Fig. 7.16 Detector and external reference signal amplifier ACS

50  $\mu$ s/div 2 V/div

50  $\mu$ s/div 2 V/div

0.5 ms/div 2 V/div

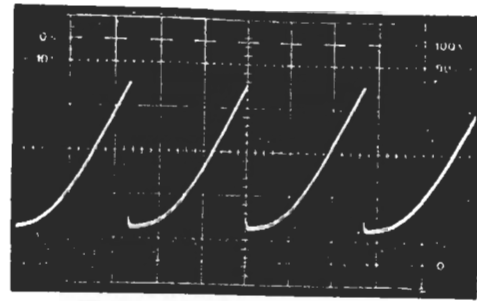
0.5 ms/div 2 V/div



5 ms/div

2 V/div

0 V

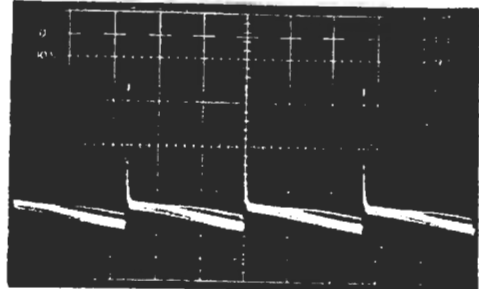


17

5 ms/div

50 V/div

0 V

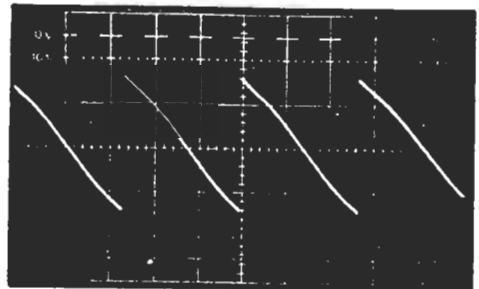


18

5 ms/div

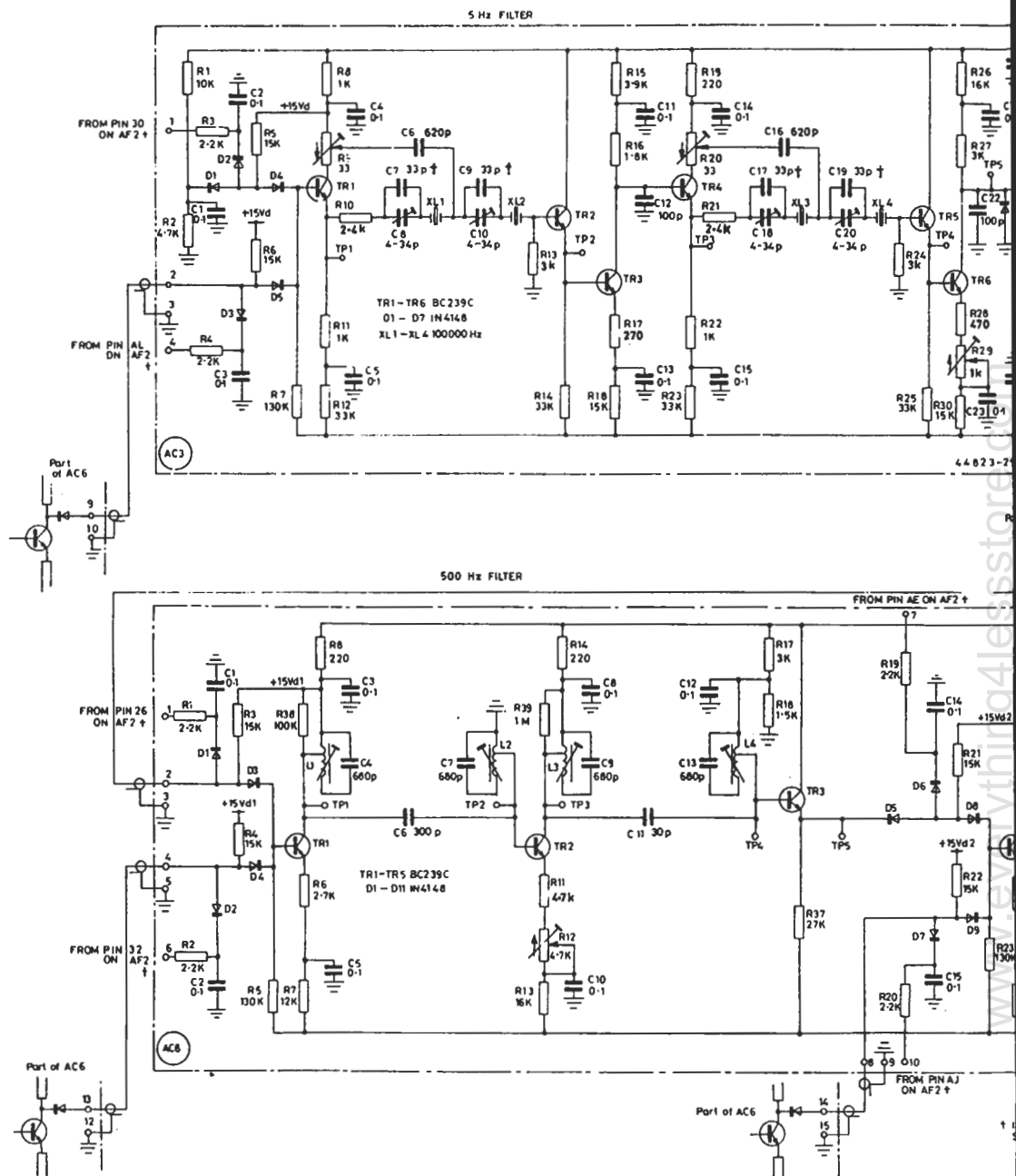
1 V/div

0 V



19





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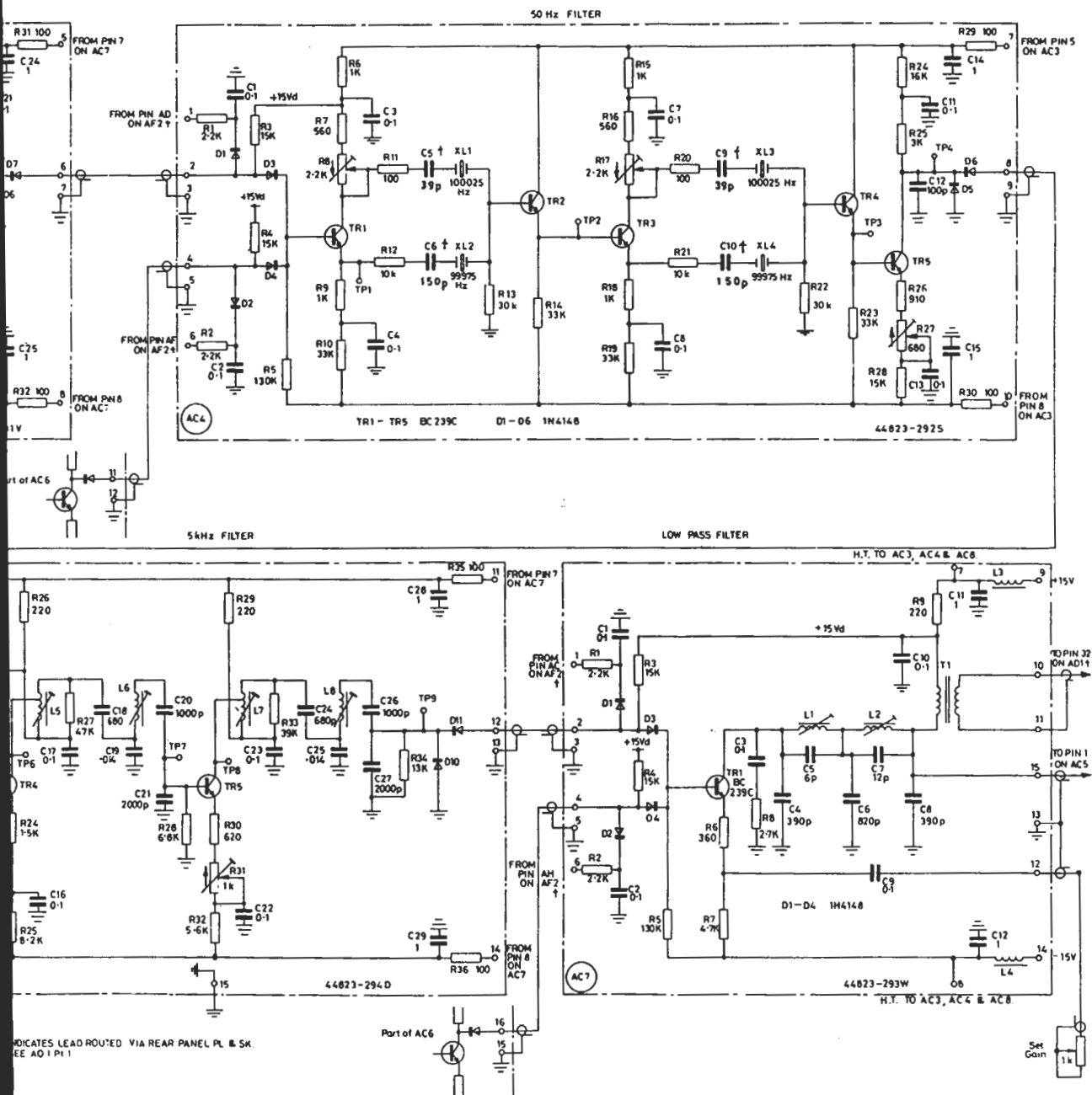


Fig. 7.17 Circuits: AC3, AC4, AC7 and AC8